Chemical Week

September 28, 1957

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PETROCHEMICALS

CW Report page 45

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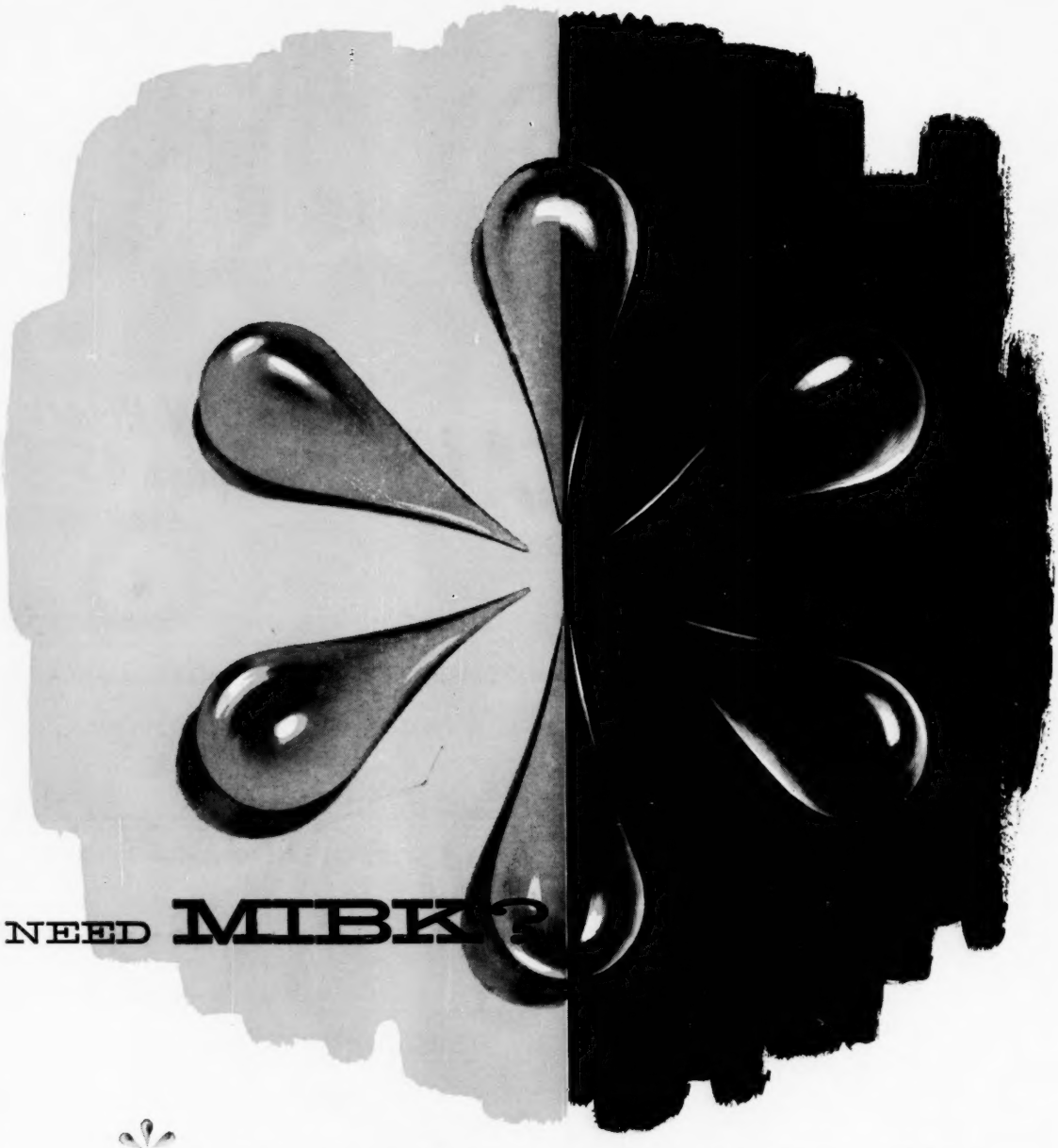

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Chemical Week

TOP OF THE WEEK **September 28, 1957**

Safety is plus factor of this new tank car. Why? It's a domeless tank car ..... **p. 23**

How to spur creativity of research personnel, how to motivate them are topics of Washington research management conference ..... **p. 68**

Unitized pilot-plant setup saves time and money for Lummus Engineering ..... **p. 88**

Vol. 81
No. 13

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Watch CW Grow — 37,576 copies of this issue printed

(Petro)Chemical Week

This week, we welcome to our ranks of readers many former subscribers to *Petroleum Processing*, which ceased publication with its September issue. Former *PP* readers will find, on p. 45, a *CW Report* on petrochemicals, based in large measure on material compiled by the *Petroleum Processing* staff.

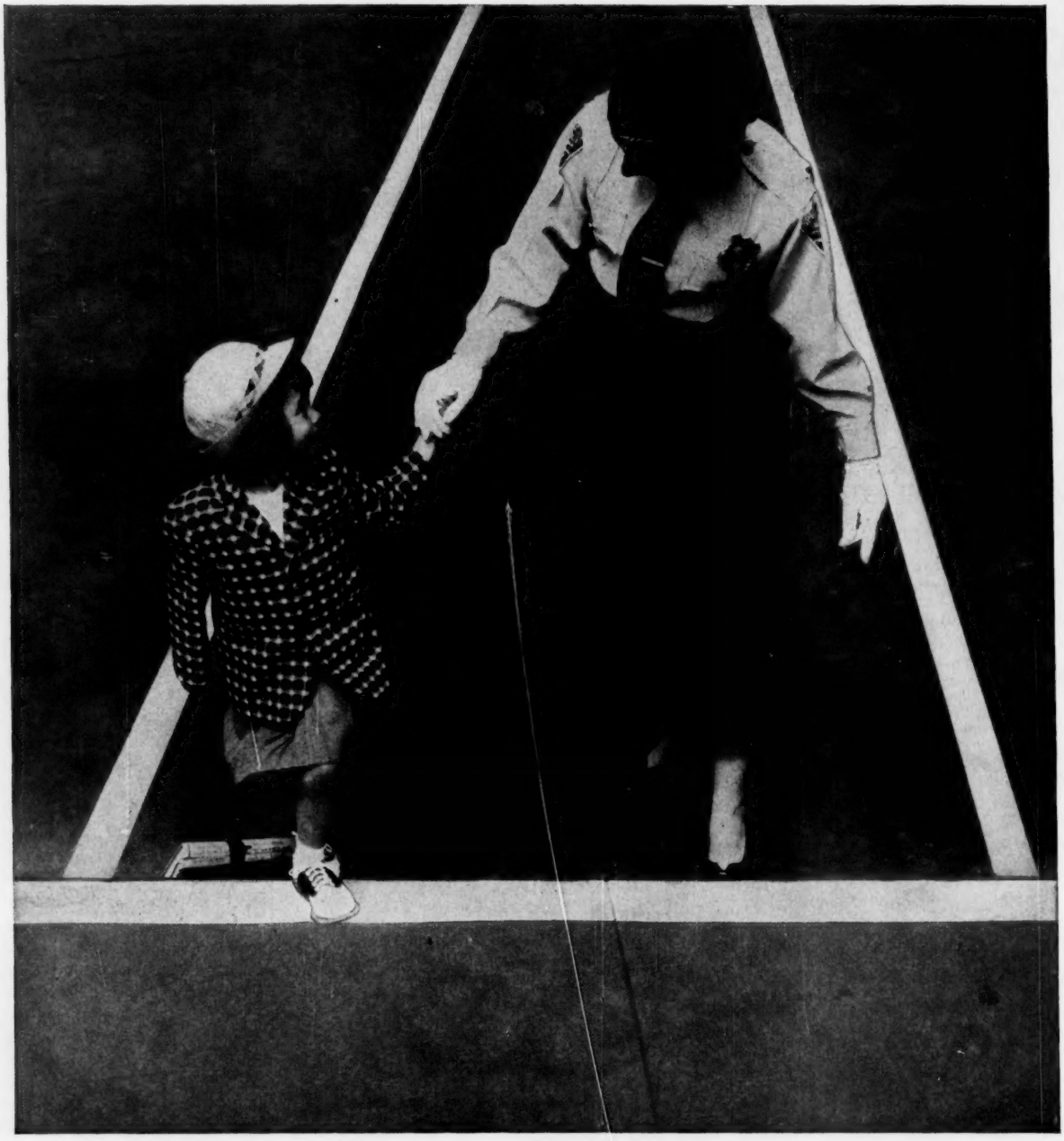
Such a report doesn't look the least out of place in CHEMICAL WEEK. Indeed, we published one of the first comprehensive reports on petrochemicals (*CW, Sept. 29, '51, p. 19*); and over the years, we have reported comprehensively on petrochemical developments—see, for example, *CW, July 31, '54, p. 35*. The fact that such reporting doesn't look out of place in *CW* is one of the reasons why McGraw-Hill decided to discontinue *PP*.

We have always maintained that there is no separate "petrochemical industry"; it is part and parcel of the chemical industry—the part that bases its production on petroleum raw materials. Therefore, insofar as petrochemicals are a segment of the chemical industry, developments therein are extensively reported and interpreted—and always have been—in CHEMICAL WEEK.

Petrochemicals themselves, of course, loom large in the chemical industry, and they'll become even more prominent in the future. But the styrene maker, for example, doesn't care (unless the price or purity is different) whether the benzene he buys came from Texas oil or West Virginia coal. Nor does the manufacturer of distillation equipment—coal-tar benzene and petrobenzene both boil at 175 F.

And petrochemicals are not the only aspect of petroleum processing in *CW*'s bailiwick. Petroleum refining is one of the noteworthy chemical process industries and is therefore a field to which *CW* editors give broad coverage.

Howard C. E. Johnson
Editor-in-Chief



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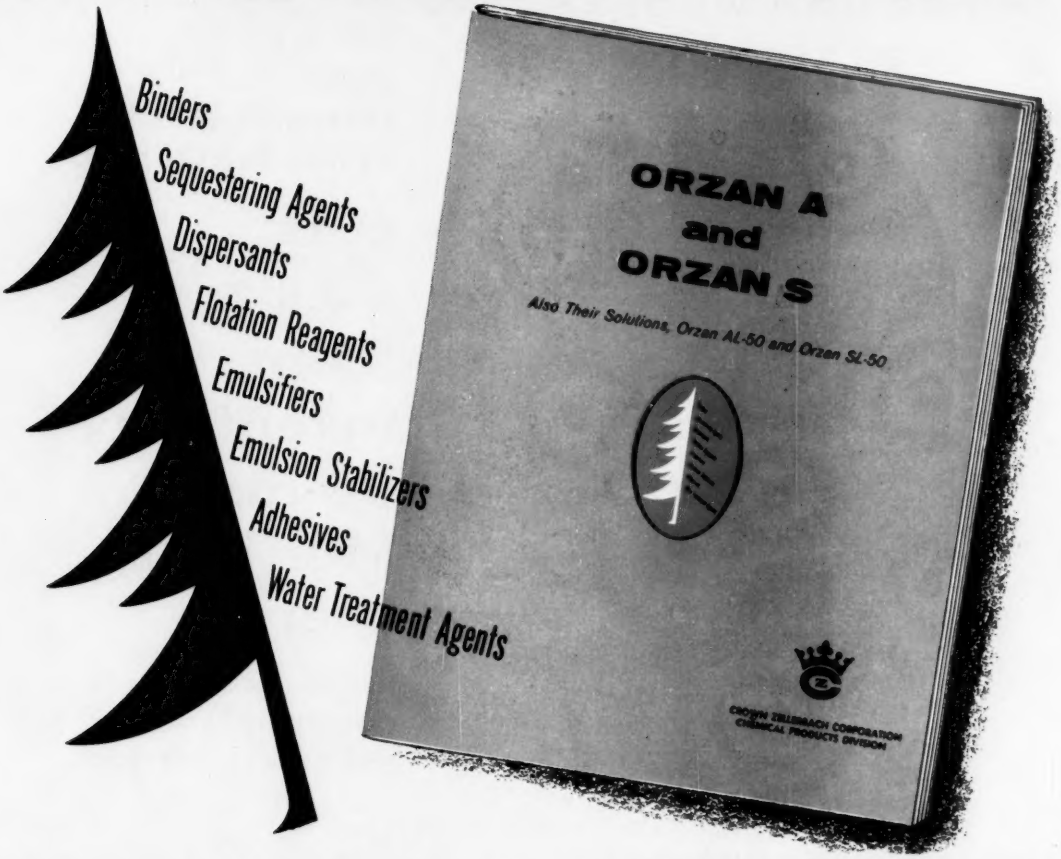

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The centipede was elated. "I accept your suggestions without hesitation, Owl," he said. "Now, just tell me, specifically how do I go about making this change?"

"Oh," said the owl, "I wouldn't know about the details. I'm in general policy."

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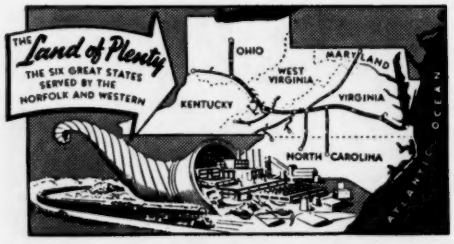

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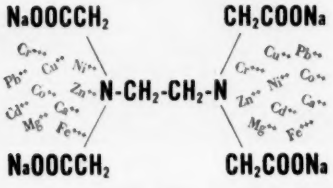

or alkali, even at elevated temperatures. In fact it takes strong oxidizing reagents such as permanganate or dichromate to even make a dent in its sturdy molecular structure.

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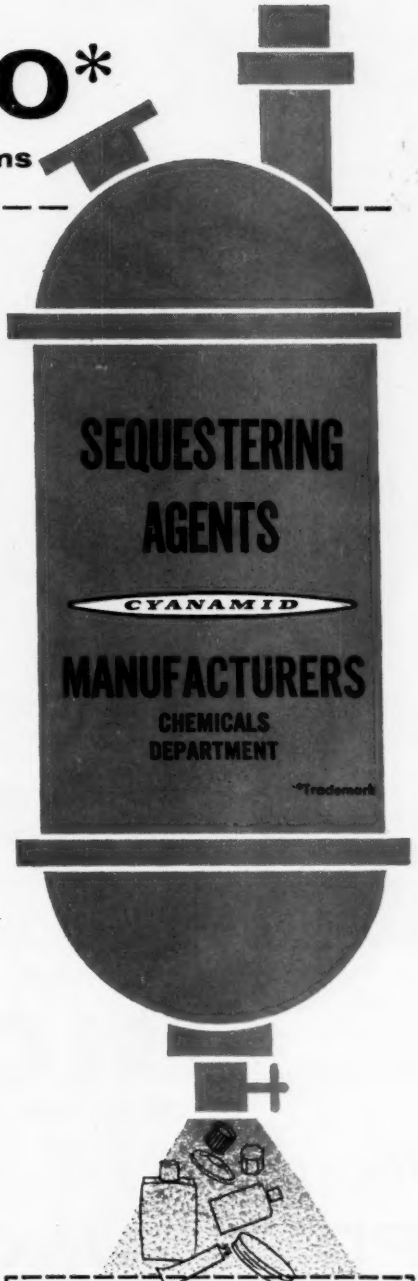

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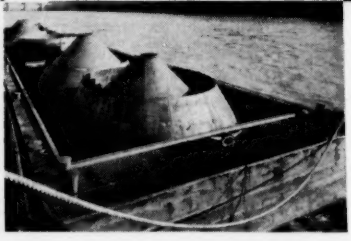

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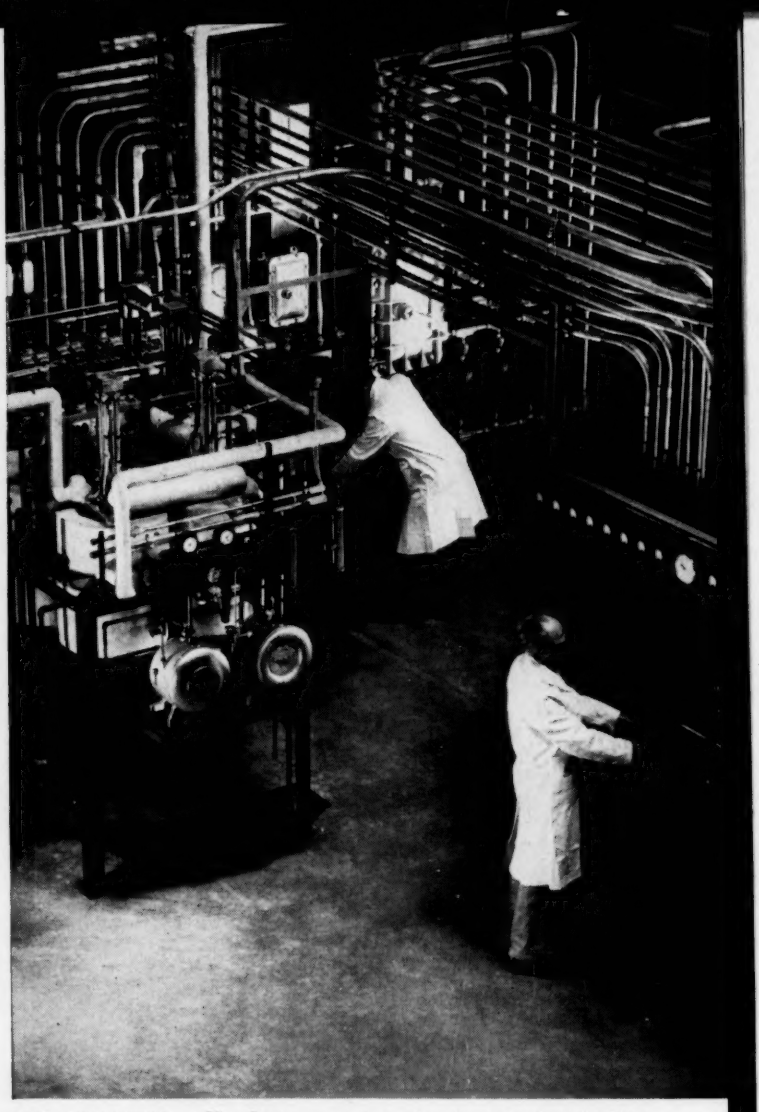
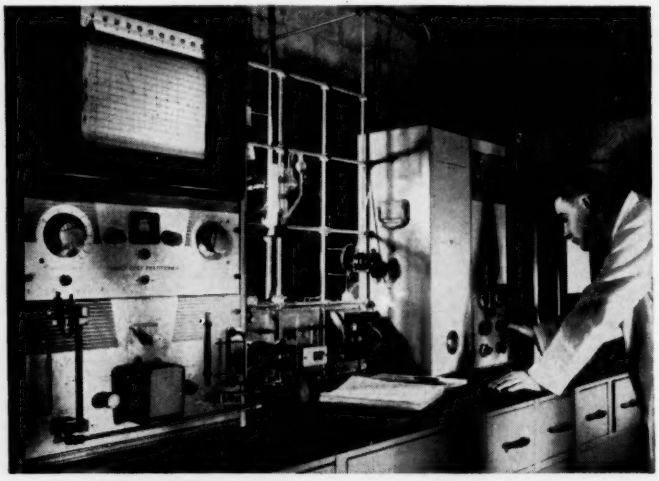


MOST PILOT UNITS at The Center are put together from standard "building blocks." Skid-mounted charging units such as the one at left hold tanks, heaters and pumps for transfer and metering. Process equipment, here shown in background center, can be widely varied. At right is electrical control cabinet. All switches, relays and controls not housed in explosion-proof boxes are enclosed in cabinets like this one, pressurized with outside air to exclude process vapors.



ANALYSIS OF MATERIALS processed and produced in pilot operations at The Center is an important part of the work carried out by Lummus engineers. Here a laboratory technician determines the composition of a multiple-component gas, using a gas chromatography technique.

Business Newsletter

CHEMICAL WEEK
September 28, 1957

While drugmakers pushed new effort toward common cold vaccines (*see p. 21*), they were running behind on the Asian flu vaccine, according to the U. S. Public Health Service. USPHS, with a goal of 8 million doses of the vaccine by mid-September, has so far released only 5.4 million for use. USPHS doesn't regard the setback as serious, however, and says there's no reason to alter its year-end estimate that 85 million doses of the vaccine will be available by Dec. 31.

•

U. S. and Canadian chemical companies rushed technical aid to Thamesville, Ont., late last week, to help clean up 25,000 lbs. of sodium cyanide strewn along a 400-yd. strip of railway as a result of a train-truck collision. Close to 150 citizens pitched in to gather the cyanide, in the form of golf ball-size pellets, before it could contaminate the water supply of the small Canadian community, which gets its water from shallow wells and the nearby Thames River.

•

Jefferson Lake Sulphur Co. postponed a proposed stock offering last week, after Texas Gulf Sulphur and Freeport Sulphur cut sulfur prices $3/ton (*see Market Newsletter, p. 85*). Jefferson, which had planned to issue the new common stock this week to its shareholders on a one-for-each-five-held basis (*CW, Sept. 7, p. 25*), says the postponement is "temporary."

•

A union putting $1 million into technological research? The Amalgamated Lithographers of America union this week offered the $1 million, if matched by a contribution by management, toward a fund to "harness new technological developments [in lithography] for the mutual benefit of the industry and the consuming public." The union, long known for its enlightened attitude toward research and its good relations with management, established the fund on the first day of its current convention in Chicago.

•

New impetus for dry-bleach use in industry and the home came this week, as Westvaco revealed plans for 6-million-lbs./year production of solid organic bleach products. Westvaco, a division of Food Machinery and Chemical Corp., will begin installing equipment at its Charleston, W. Va., plant Jan. 1 for the manufacture of trichlorocyanuric acid, dichlorocyanuric acid and the dichloro's sodium salt. Westvaco, by putting its new equipment in an already existing building, hopes to have the new facilities operating by July '58, thus supplementing its current semiworks 1-million-lbs./year production.

The chlorocyanuric acids, now made by Monsanto and Wymat Chemical as well as by Westvaco, have taken over a number of applica-

tions formerly held by dry and liquid sodium hypochlorite bleaches. They're used in household dry bleaches, scouring powders, laundry bleaches and germicidal compounds.

•

By setting a 50-million-lbs./year goal for Terylene fiber production and halting production of Ardil protein fiber, Britain's Imperial Chemical Industries is plainly putting its chips on the polyester type of synthetics. ICI hopes to have its Terylene output up to 30 million lbs./year by '59 (it is now 22 million lbs./year); won't put a due date on its 50-million-lbs./year goal.

In addition to the polyester fiber expansion, ICI will go into the manufacture of polyester film, which it will sell under the tradename Melinex.

Ardil, a protein fiber derived from peanuts, has been made for the past six years at a $7-million plant in Ayrshire. Although the plant has a 22-million-lbs./year capacity, the fiber has met with "disappointing" acceptance. Close-down date has not been set.

Du Pont is also halting production of one fiber—Type 168 rayon. Manufacture of the high-tenacity tire-cord rayon, now carried out at Du Pont's Richmond, Va., plant, will be discontinued Dec. 1.

But Du Pont may build a textile fiber and yarn plant in Europe. It has been making a study of the possibilities of building a plant there; a member of Dutch Employers' Assn. has claimed that Holland is the most likely location for the venture. Du Pont is currently building a neoprene plant in Londonderry, North Ireland.

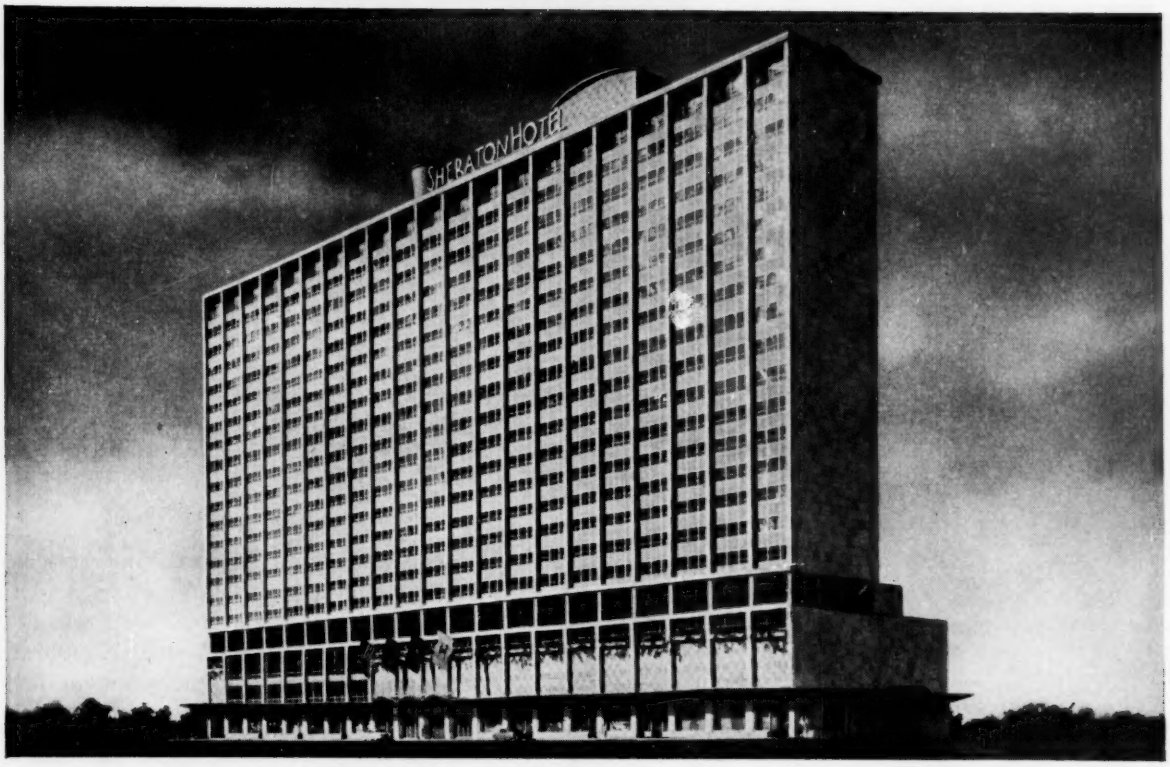
•

The government seeks to dispose of its Cuban nickel plant, now that commercial supplies of the metal appear good (*CW Market Newsletter, July 20*). General Services Administration will soon call for bids on the 50-million-lbs./year plant, in which the government has invested some $85 million; GSA is interested in either selling or leasing the plant. Nickel Processing Corp. currently operates the facility, and National Lead, its majority stockholder, has expressed some interest in buying it.

•

Still seeking to organize Kanawha Valley, W. Va., chemical plants, Oil, Chemical and Atomic Workers International Union has petitioned National Labor Relations Board to hold an election at the Union Carbide Chemicals' Institute, W. Va., plant. NLRB will likely hold a hearing soon to determine whether to hold the elections.

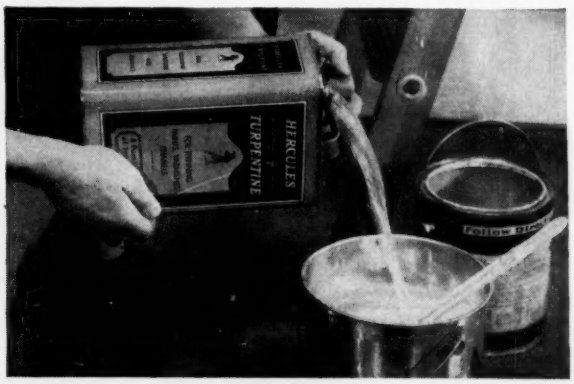
HOW HERCULES HELPS...



ADD COLOR TO THE PHILADELPHIA SHERATON—Lobbies, corridors, and public rooms of this newest addition to America's distinguished hotels are decorated with "Tweed," Raffi & Swanson's multicolor lacquer*. Multicolor coatings based upon Hercules® nitrocellulose add a touch of decorative beauty wherever applied, yet are extremely durable and easily cleaned. Architects and decorators are finding multicolor lacquers add variety to a wide range of interior surfaces.

*U. S. Patent No. 2,591,904 held by Coloramic Coatings, Inc., Los Angeles.

HANDLOADERS—Hercules® smokeless powder for handloading, available in five grades, provides the ultimate in ballistic performance for the do-it-yourself shooter.



MAKE PAINT GO FURTHER—Hercules® Steam Distilled Wood Turpentine, a dependable thinner on the market for more than 30 years, keys paint to the surface, makes it less liable to crack or scale. Available everywhere in pint, quart, gallon, and 5-gallon orange and black cans.

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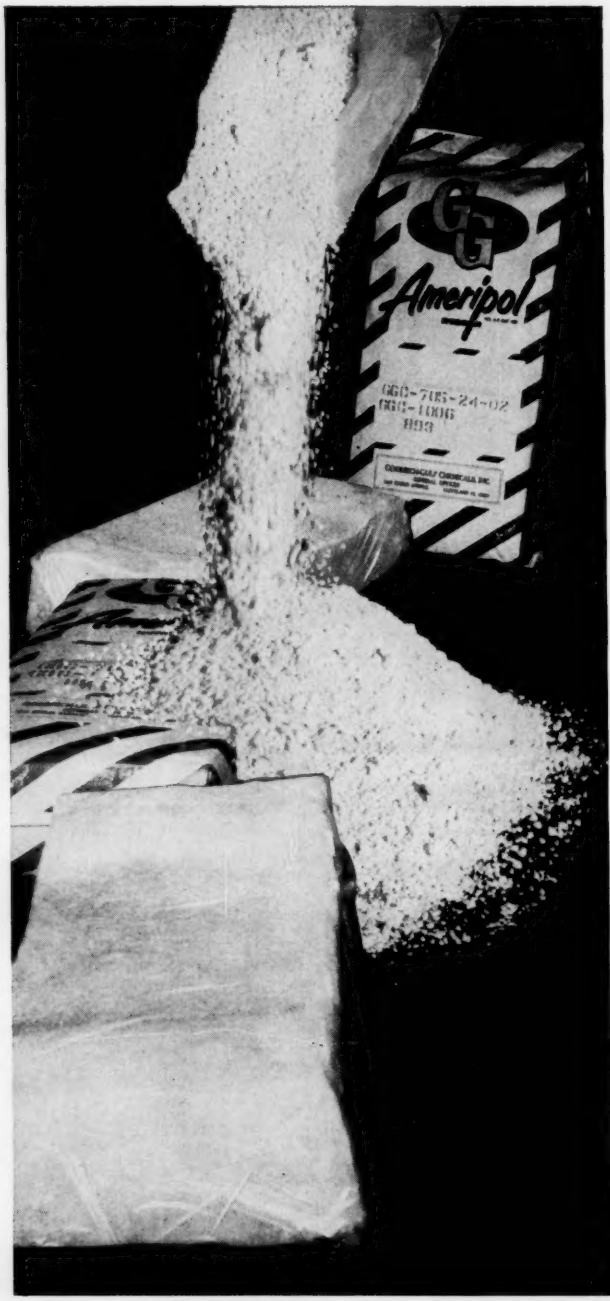
HERCULES

CHEMICAL MATERIALS FOR INDUSTRY

G57-7

Goodrich-Gulf Chemicals, Inc.



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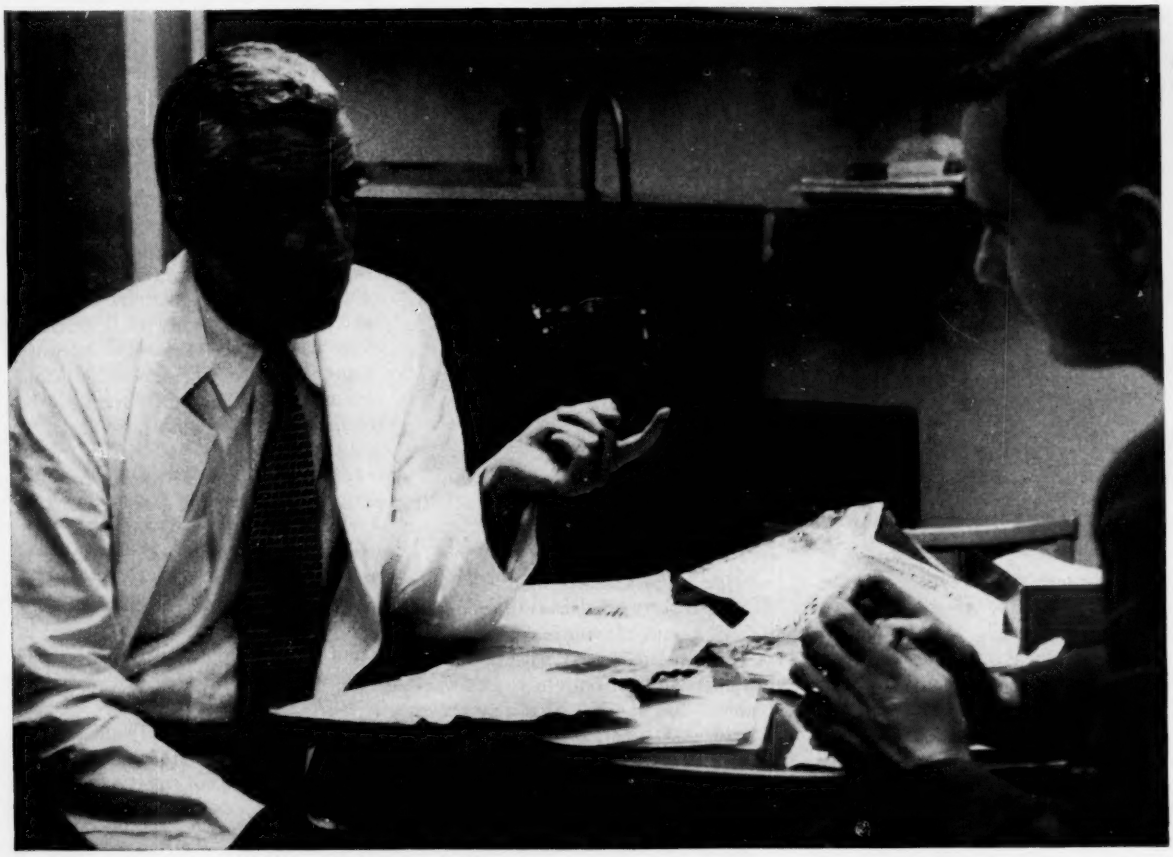
Chemical Week

September 28, 1957



'A combination of amino acids and vitamins turned the trick, vaccine discoverer Price tells CW editor.'

Behind the Big Cold-Vaccine Breakthrough

From Baltimore, Md., last week came the news that a Johns Hopkins researcher had isolated one of the many groups of viruses believed to cause the common cold. He is Winston Price, scholarly head of Johns Hopkins' medical ecology staff. The full significance of Price's triumph over a problem that has defied the world's best medical brains is not yet entirely clear. But Price believes his discovery opens the way to the development of a broadly useful vaccine to protect against the common cold.

Lumped in this category are upper-respiratory infections that disable the average U. S. citizen three times a year; cost to industry is $5 billion a year in lost time, lowered production.

Poring over a stack of congratulatory letters and telegrams, while giving much credit to those who took part in the project that has yielded what has been described as "the first successful cold vaccine," Price told *CW* —in an exclusive interview last week— that he found the right track quite by accident.

While working on influenza virus back in mid-1954, he found that he could also grow JH (for Johns Hopkins) virus, a tiny disease carrier that he later pinpointed as the one that causes about 30% of "common colds." Speaking haltingly, Price modestly says, "We were lucky. The real problem was to find the right medium in which to grow the virus." A combination of amino acids and vitamins turned the trick.

Overrated? Price feels that his work has been far overrated in the press. "You know," he says, "we don't rate all that page-one treatment we have been getting. All this is merely the first step in the right direction. There's an awful lot left to be done."

Price may be referring to his estimate that JH virus accounts for only 30% of all the colds he has observed during the two years he has been on the project. And he feels that the number of persons in his control group was not large enough to suit him. But in his first 400-person group, the vaccine proved effective in 80% of cases.

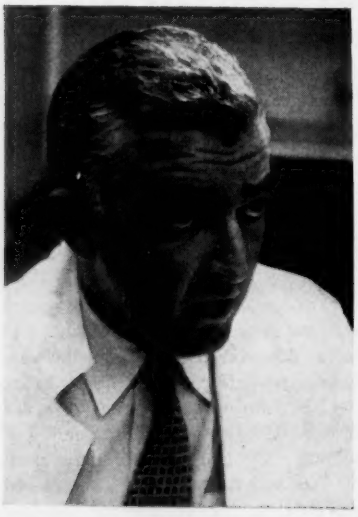
Later, during an outbreak of colds of the JH type at a Baltimore boys' school, only 100 subjects were used; 50 received the vaccine, 25 received placebos, or blanks, and 25 received an injection of saline solution. Only three of the 50 children who got the

'All this is just the first step in the right direction.'

vaccine came down with colds. Incidence among the other groups was eight times higher.

'No Comment': Results like this would bode well for the vaccine's commercial prospects. But Price gives an emphatic "no comment" when asked whether he thinks the vaccine will be made on a large scale by pharmaceutical companies.

It is known, however, that several companies are looking into the cold vaccine situation quite thoroughly. A spot check of vaccine makers reveals that Eli Lilly has been working on JH vaccine for several months. And Merck reports that it is thoroughly checking into the subject.



'We were lucky . . . There's an awful lot left to do.'

These companies, as well as others, are interested not only in Price's vaccine but also in others that may prove equally good—perhaps better. At any rate, there is no guarantee of how soon the Johns Hopkins vaccine will go into large-scale production, if indeed it ever does.

Within two or three weeks, Parke, Davis—another big vaccine producer—hopes to get its own vaccine on the market. Not the JH type, it's a trivalent material* containing antibodies against three major strains of adenoviruses. It proved 50-70% effective in quelling colds that might have originated in adenoidal infections. On this basis—P,D says—it might prevent about one-third of infectious common colds.

No All-Out Endorsement: Price's vaccine has not had all-out endorsement as a cold cure from scientific authorities—or indeed from Price himself. While the news of his work has sparked much comment, there's considerable restraint in most informed reports—in the U.S. and from abroad.

CW's correspondent in Bonn, Germany, reports that the initial response at the Bonn University Hygiene Clinic, Bonn's health office, is skeptical, accompanied by an unwillingness to comment before detailed scientific reports of Price's work are available.

*Made from APC virus, named after its adenoidal, pharyngeal and conjunctival effects. The virus in question is known as adeno-virus types 3, 4, 7, apparently causes cold symptoms only in young men.

At the Pasteur Institute in Paris, the feeling is much the same—scientists say that the press reports are not sufficient basis for conclusions. Comments from U.S. health authorities are more optimistic, but it's very restrained optimism. These comments are typical: "Looks good, but how can we tell for sure until we know more about the tests?"; or "control group was small, but results are encouraging."

Yale Kneeland, associate professor at Columbia University medical school and chief of the Scientific Advisory Committee for the Common Cold Foundation, perhaps best sums up the feeling of his American medical colleagues.

Says Kneeland: "The news from Dr. Price's laboratory at Johns Hopkins University is of great interest . . . seems like an important advance. It must be borne in mind, however, that this is by no means a complete solution of the problems of the common cold . . . There still remains a considerable unknown area that needs intensive exploration."

Price's breakthrough will supply the impetus to assure that this unknown area does not want for research attention.

Lab with Friends—Now

U. S. Rubber Co. formally dedicated its new research building at countrified Wayne, N. J,. last week. The university-like research structure, built at a cost of around $5 million, met with the full approval of once-hostile neighbors who, in 1954, loudly voiced their objections in court (CW, April 24, '54, p. 101).

Now, with everyone happy (disputed wooded hillside was preserved), U. S. Rubber plans to go full steam ahead on a research and development program that will require $120 million in the next five years.

"In spending the $120 million, we have three main objectives," H. E. Humphreys, Jr., president, said: to develop better tires, to put rubber into more roles now held by metals, and to find new applications of atomic energy to the rubber industry.

In pursuit of the first aim—passenger tires that will give trouble-free performance at turnpike speeds — U. S.

Rubber is now displaying three experimental "tires of the future":

- A polyurethane rubber tire claimed to give 200% better mileage than tires now used.
- An improved butyl rubber tire that can withstand operating temperatures of 400 F.
- A silicone-and-wire airplane tire for use on supersonic craft that's able to withstand temperatures that would reduce ordinary tires to jelly.

Hot Line: Shown at the research center was a new plastic hot water pipe—a combination of acrylonitrile, butadiene and styrene. It can withstand 220 F temperatures (*CW Market Newsletter, Sept. 21.*).

Atomic Energy for Rubber: As its third goal, the firm seeks ways to utilize atomic energy. Experimenting with a 2-million-volt electron accelerator, it has already found ways to use radiation to cure rubber.

In building a development center with "the university atmosphere conducive to the best in scientific research," U. S. Rubber affirmed its faith in the results of previous research it has done. The new structure utilizes 14 of the company's products—ranging from upholstery fabrics to plastic pipe —in its construction.

Varied Profits in Paper

There were varying viewpoints on the profit prospects of the paper industry expressed before New York financial experts last week.

International Paper Co. and Crown Zellerbach Corp. took a sharp look at this year's downswing in earnings, and viewed the future with "subdued optimism," while a third papermaker, Georgia-Pacific Corp., found plenty of encouragement in the six-month earnings picture, which promises it a better year in '57 than '56.

International's secretary, William Hanway, says that "earnings for the last six months of this year are expected to equal those established in the last six months of '56"—the start of the company's substantial downswing in earnings. And Crown Zellerbach reports that '57 earnings, although the third highest in history, should approximate $40 million (after taxes)—$10 million less than in '56.

On the brighter side is Georgia-Pacific's outlook. O. R. Cheatham, chairman and president, said that "earnings in '57 are expected to finish strong. For the first six months in '57, earnings rose to $4.2 million, compared with last year's $7.5 million."

International Paper's Hanway looking at '58 with 'subdued optimism.'

Summer Sales High: July-August sales were up for both Georgia-Pacific and Crown Zellerbach. In July, CZ had a marked pickup in sales; and in August, its sales hit an all-time high, 10% higher than the first six months of '57. "September sales should be around those of July and August," A. B. Layton, CZ's president, reports.

On the other hand, Hanway reports that July business was slow, although "demand picked up sharply in August." He believes third-quarter earnings will drop from the average of the first half-year, but that fourth-quarter earnings will be a bit above average.

Both CZ and International attribute recent declines to a trio of factors:

- The Canadian dollar is now at a 4-5¢ premium. Both CZ and International sell most of the production of their Canadian plants in this country for U. S. dollars, then have to buy Canadian dollars to meet payrolls and other expenses. Georgia-Pacific owns no Canadian enterprises.
- Demand for building materials is currently low. Prices of plywood and lumber are down; manufacturing costs are up. (Georgia-Pacific makes no definite comment on this.)
- Added capacity has meant more competition, and that has meant lower mill operating ratios.

Despite the complaints about how new capacity has increased competition, all three paper companies have additional plants either planned or about due in production.

Tank Car Bids for Versatility

Union Tank Car Co. has designed a fundamental change into its new tank car—the dome and underframe have been eliminated. This reduces weight, increases the car's versatility, says Union. The new car can fill four separate roles, each of which formerly required a separate car: (1) an insulated car, (2) for general service, (3) a low-pressure car, (4) an acid carrier.

EXPANSION

Pulp: Three Canadian lumber firms, Feldman Timber Co., Rudolph-McChesney Lumber Co. and A. E. Wicks, Ltd., have formed a jointly owned company, Porcupine Forest Industries, Ltd., to build a $5-million, 150 tons/day chemical pulp mill in Timmons, Ont. Construction will get under way early in '58.

•

Naval Stores: Gulf Naval Stores Co. will this week start construction of a plant to process 200 tons/day of tree stumps into such products as pine oil and turpentine. It will be located near Nocatee, Fla.

•

Paper: Crown-Zellerbach and Time Inc. on Oct. 1 will award a contract for constructing the firms' jointly owned $31-million paper mill at St. Francisville, La. Project manager Lee Maybach said construction will get under way immediately, with completion slated for May '58.

•

Cement: Colonial Sand & Stone Co. is planning a $1.5-million cement plant at Kingston, N.Y. The mill, scheduled for completion late in '58, will have a capacity of 2,500 bbls./day.

•

Rubidium: Engineers at Montgary Explorations' mine at Bernic Lake, Man., have discovered rubidium deposits in addition to the spodumene and cesium ores found earlier (*CW, Aug. 10, p. 24*). The rubidium is contained in a pocket of pollucite, one of the ores of cesium. Pollucite deposits are estimated at 150,000 tons.

COMPANIES

Plastics: Minneapolis-Honeywell Regulator Co. (Minneapolis) is diversifying into large-scale production of plastics. The company will make four epoxy casting and potting compounds used by the electronics industry to protect delicate instruments from vibration, fungus and other damage.

•

B.F. Goodrich Aviation Products, division of B.F. Goodrich Co., has purchased land and buildings formerly owned by West Coast Loading Co. at Rialto, Calif. Goodrich will continue its research on rocket propellents at the new location.

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Dow Chemical Co. directors last week voted a 2% stock dividend, one share for each 50 held, to stockholders of record Sept. 25. The dividend, similar to the one paid last year, is in addition to the regular 30¢ quarterly payment.

•

Kaiser Aluminum & Chemical Co. has closed its fluorspar mill near Fallon, Nev., and facilities have been placed on a stand-by status. Earlier this year, the company's fluorspar mine near Gabbs, Nev., which supplied ore for the Fallon mill, was shut down.

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Pennsalt Chemicals Corp. will sell its water properties serving Natrona and Natrona Heights, Pa., to Clearview Water Supply Co., a subsidiary of General Waterworks Corp. The holdings, which include a filtration plant and transmission systems, were used to supply Pennsalt's first chemical plant at Natrona in 1850. Pennsalt's president, William Drake, said the decision to sell was "based on the practical conclusion that operation of a municipal water system is no longer a logical part of Pennsalt's business."

•

General Tire & Rubber Co. stockholders, at a special meeting held last week, approved plans to boost authorized common stock in the company to 7.5 million shares from the present 2.5 million shares. The increase will permit a 3-for-1 split of the common stock planned later this year.

•

Curtiss-Wright of Canada Ltd. is negotiating to acquire Isotope Products Ltd. (Oakville, Ont.). Terms, which call for an exchange of stock, have been approved "in principle" by Isotope Products' directors; stockholders of the firm will be asked to approve the merger within the next three weeks.

•

Vitro Uranium Co., division of Vitro Corp. of America, has signed a contract with Jen, Inc. (Moab, Utah), for purchase of large quantities of low-lime uranium ore. Jen will ship the ore from four of its claims in San Juan County, Utah, to Vitro's Salt Lake City mill for processing. Terms of the agreement, which extends to March 31, '62, call for Jen to ship a maximum of 10,000 tons/month—with an option to increase shipments to 12,000 tons/month on 30-days notice. Value of the ore concerned could amount to $38 million if maximum amounts are shipped.

FOREIGN

Aluminum/Poland: Poland plans to boost the capacity of its Skavinia aluminum mill (near Krakow) by 500 tons/year. No government funds will be used in the $620,000 expansion—the investment has been planned and will be worked out via "capitalistic rules," admittedly unorthodox for Poland's economy.

•

Salk Vaccine/Hungary: The Hungarian Foreign Trade Ministry has purchased 250,000 cc. of Salk vaccine from Canadian producers—enough to vaccinate almost 400,000 school children. The ministry is attempting to buy additional vaccine from Western producers until the country has enough to vaccinate all Hungarian children of school age.

MATHIESON CHEMICALS

Multi-Plant Production

Ammonia, *Anhydrous,* Refrigeration Grade (99.98%) and Commercial Grade (99.50%). In 26-ton tank cars from Morgantown, W. Va., Lake Charles, La., Niagara Falls, N.Y., Marcus Hook, Pa. and Louisiana, Mo. *Aqua Ammonia,* 26° Bé. (29.4%), in 8,000-gal. tank cars from Niagara Falls and Louisiana, Mo.

Ammonium Nitrate. *83% Solution* in 10,000-gal. tank cars and in tank trucks from Ordill, Illinois. *Solid,* in prilled form, in moisture-proof bags from Ordill.

Bicarbonate of Soda. *U.S.P.,* Powdered and Granular; *Miller's Special Regular* and *Miller's Special No. 2;* and *Fine.* 100-lb. moisture-proof paper bags from Saltville, Va.

Carbon Dioxide. *Dry Ice* in 55-lb. blocks from Saltville, Va. and 18 Olin Mathieson-operated warehouses. *Low-Pressure Carbon Dioxide* in tank cars and tank trucks from Saltville, Va., Philadelphia, Pa., Baltimore, Md., and Washington, D. C. *Carbonic Gas* in 50-lb. and 20-lb. net cylinders from Saltville, Va. and all Olin Mathieson-operated warehouses.

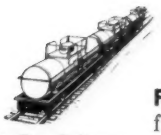
Caustic Potash. *45% Liquid,* in tank cars from Niagara Falls, N. Y.

Alert Traffic Control

Caustic Soda. *50% Liquid and 73-74% Liquid,* Rayon Grade and Commercial Grade, in 8,000-gal. and 10,000-gal. insulated and lined tank cars, from Lake Charles, La., Niagara Falls, N. Y., Saltville, Va. and McIntosh, Ala.; also Commercial Grade from Huntsville, Ala. *50% Liquid* available in tank cars and barges from Brunswick, Ga.; in barges and tankers from Lake Charles, and in barges from McIntosh and Huntsville. *76% Solid and Flake,* from Lake Charles and Saltville; *76% Granular and Ground,* and *MCC Flake Bottle Wash,* from Saltville.

Chlorine. *Liquid,* in 16-ton, 30-ton, and 55-ton single-unit tank cars from Niagara Falls, N. Y., Huntsville, Ala., McIntosh, Ala., Saltville, Va., Arvida, Que., Gramercy, La., and Brunswick, Ga.; also in multi-unit tank cars of 15 tons from Niagara Falls, N. Y., and Huntsville, Ala.

Ethylene Diamine. Used in the synthesis of ethylene diamine tetracetic acid salts (chelating agents) and surfactants; forms resinous polymers with formaldehyde resin systems. Tank cars, tank trucks, returnable tin-lined drums (420 lbs. net) from Morgantown, W. Va.



On-Time Deliveries

Formaldehyde. Available in four grades — 37% inhibited, 37% low methanol, 45% low methanol and 50% low methanol (other grades also offered)—in tank cars and tank trucks from Morgantown, W. Va.

Hexamine. As a chemical intermediate, hexamine (hexamethylenetetramine) provides water-free formaldehyde and tertiary amines. Useful in resin manufacture. Multi-wall paper bags (80 lbs. net) and fiber drums (100 lbs. net) from Morgantown, W. Va.

Hydrazine and Derivatives. Hydrazine is now available in several forms and in a number of derivatives. As an exceptionally effective reducing agent, oxygen scavenger and nitrogen "building block", hydrazine has many uses. *Scav-Ox* is a 35% hydrazine solution specially prepared for boiler feedwater treatment. Drum lots from Lake Charles, La., and Rochester, N. Y. Literature on request.

Rapid Communications

Hypochlorite Products are available in a number of forms and packages, each adapted to a specific application: *HTH Granular* and *HTH Tablets* for use in water treatment as efficient chlorine carriers and disinfectants; *HTH Granular Bleach* for use in preparing uniform bleach solutions in the power laundry. *Lo-Bax Special, LoBax-W* and *HTH-15* are chlorine sanitizing agents for dependable sanitation on dairy and poultry farms, in dairy and other food plants, and in food and beverage service. *Ad-Dri Bleach,* for dry addition to the commercial laundry plant washer, and *HTH Soda Bleach Mix,* are other HTH products for laundry bleaching. Literature upon request.

Methanol. Tank cars, compartmented cars, barges, tank trucks and drums (358 lbs. net) from Morgantown, W. Va.

Muriatic Acid. *18° Bé.* (27.92% HCl), *20° Bé.* (31.45% HCl) and *22° Bé.* (35.21% HCl) in tank cars from McIntosh, Ala.

Nitric Acid. *52.3 to 68%* (36 to 42° Bé.) in tank cars and tank trucks from Lake Charles, La. and Ordill, Illinois. *94.5 to 95.5% concentrated acid* in tank cars and tank trucks from Ordill.

Polyamines 333 and 910. Semi-refined, liquid mixtures, used in the preparation of asphalt additives, corrosion inhibitors, emulsifiers, demulsifiers and wetting agents. Tank cars, compartmented cars, tank trucks and drums (430 lbs. net) from Morgantown, W. Va.

Barge Facilities

Rubber Chemicals. *Activator D74* is a low-cost, secondary accelerator to supplement primary accelerators in GR-S tire tread compositions. Increases flex resistance, improves curing characteristics, prevents prevulcanizing "scorchiness".

Bunac Rubber Reclaiming Oil is an easily-handled, formulated compound designed as an improvement on solid rosin in the rubber reclaiming process. Saves compounding costs at the plant, is non-staining, improves tensile strength.

Mathieson rubber chemicals are available in 55-gallon steel drums and in tank cars from Rochester, N. Y.

Soda Ash. *Light,* in 100-lb. multi-wall paper bags and in bulk carloads from Saltville, Va. and Lake Charles, La.; also in barges and in ocean steamers from Lake Charles. *Coarse Light,* in bulk carloads from Saltville. *Dense No. 1* in 100-lb. multi-wall paper bags and in bulk carloads; *Dense No. 2* and *Intermediate Dense* in bulk carloads; from Lake Charles and Wyandotte, Mich. *Fused Soda Ash Products: Purite*—Fused sodium carbonate in 2-lb. pigs. Used by foundrymen for better fluxing, desulfurizing and refining. Bulk carloads and carloads of 700-lb. box pallets from Saltville, Va., and 100-lb. burlap bags. *PH-Plus*—Fused sodium carbonate in ½-lb. cakes for pH control of swimming pool water and for general industrial water treatment. Also 2-oz. tablets for potable water treatment. 100-lb. burlap bags from distributors' warehouse stocks.

Rigid Quality Control

Sodium Chlorite Products include *Technical Sodium Chlorite, Textone* and *C2,* all serving primarily as a convenient and economical source of *Chlorine Dioxide* (ClO_2), a powerful oxidizing agent containing the equivalent of 263% available chlorine. Widely used in potable water treatment, textile processing and bleaching of paper pulp. Sodium Chlorite Products are shipped in 25-lb. pails and in 100-lb. lithographed steel drums from Niagara Falls, N. Y.

Sodium Methylate. Used in the upgrading of fats and oils and as an intermediate in the production of vitamins, dyestuffs and pharmaceuticals. Shipped in dry form in 200-lb. drums and 10-lb. pails, and as a 25% solution in methanol in drums (425 lbs. net), from Niagara Falls, N. Y.

Sodium Nitrate. *Synthetic, prilled,* in 100-lb. multi-wall paper bags (palletized loading optional) and bulk carloads (box or hopper cars) from Lake Charles, La.

Expert Technical Service

Sulfate of Alumina. *Activated Alum Brand,* in multi-wall paper bags from Baltimore, Md.

Sulfur, Processed, including five grades for general industrial use and a full line of regular, conditioned and oil-treated sulfurs for the rubber industry. Available from Houston, Texas, and from distributors' warehouse stocks.

Sulfuric Acid. Available in the following grades: *60° Bé.* (77.67% H_2SO_4), *66° Bé.* (93.19% H_2SO_4), *98% H_2SO_4, 99% H_2SO_4, 100% H_2SO_4, Oleum 20%* (104.5% H_2SO_4) and *Oleum 25%* (105.63% H_2SO_4). Shipping points: Baltimore, Md., Little Rock, Ark., Bossier City, La., Beaumont, Tex., Port Arthur, Tex., Pasadena, Tex., and Palmerton, Pa. Available from all plants in tank cars and tank trucks; also barge shipments from Baltimore, Md.

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INDUSTRIAL CHEMICALS DIVISION

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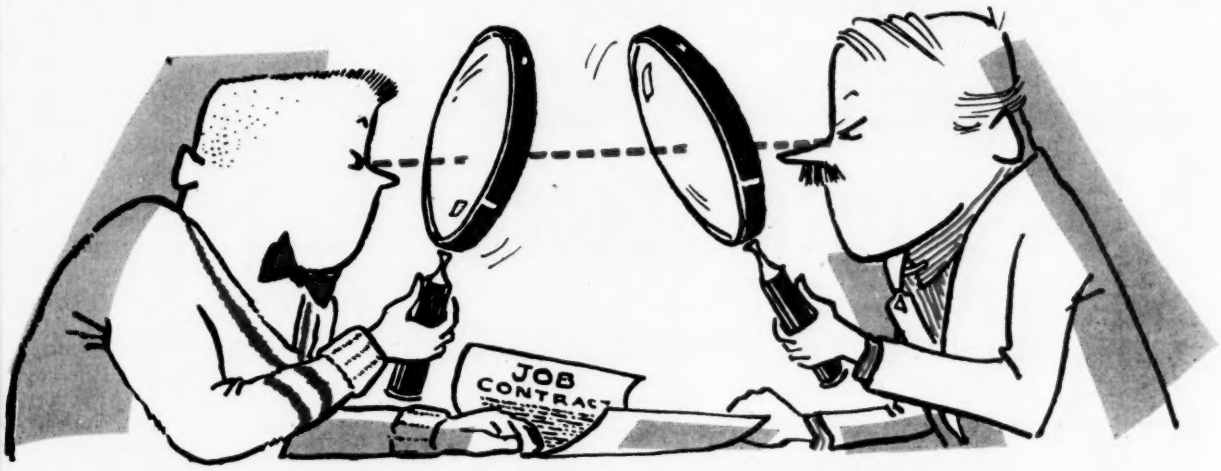

Industry's New Rules for Recruiting

- **Provide the student with factual information, free from exaggeration.**
- **Refrain from offering special incentives, or raising an offer already made, as a means of attracting the student.**
- **Give the student ample time to consider an offer, and arrange plant visits so they will interfere as little as possible with class schedules.**
- **Use consistent practices in recruiting for government-supported and privately supported work.**
- **Make all offers with sincere intention of honoring each acceptance.**

New Rules for CPI's College Recruiters

Chemical process industry personnel managers — currently enmeshed in plans for the upcoming recruiting campaigns in search of new talent— are taking long looks this week at two recent developments certain to affect recruiting strategy.

The developments: (1) a new code of ethics for college recruiting (*table, above*), and (2) a just-released survey of last season's college recruiting practices, including forecasts that new talent will cost substantially more in 1958.

On the basis of a survey conducted by Midwest College Placement Assn. and presented last week at the association's meeting in Detroit, chemical process companies can expect to pay an average starting salary of $470 a month for '58 graduates with Bachelor of Science degrees (*table, p. 30*). The over-all business and industry average, according to the survey, will be $450 a month.

But if last season's results hold true this year, chemical, petroleum and allied products organizations can expect to get a higher acceptance of job offers than industry and business as a whole.

Annual Survey: The association's survey — conducted annually — presents information compiled from 262 industrial and business organizations, including 52 chemical, petroleum and allied products concerns.

The survey indicates that 36 of those 52 process companies feel that their requirements for college-level men will remain about the same in '58 as they were during the past ('56-'57) recruiting season. Six companies said they expect to need 27% fewer college-level men than in '57, and seven companies in the group said they would need 17% more.

For all organizations reporting in the survey, 180 companies expect no change in requirements over '57, while 45 companies expect they will need 21% more graduates than last year, and 37 organizations reported that they will need 27% fewer graduates. This would indicate that overall requirements will remain about the same this season, with the possibility of a slight decrease due to a lessening of requirements by larger companies.

Starting Salaries Raised: Along these same lines, 131 companies in the total business-industry group found it necessary to up their starting salaries an average 7.3% during the past year. Thirty-four of the process companies raised their starting salaries 8% during the season.

In addition, 11 process companies granted starting pay allowances for campus activities, 22 paid extra for scholastic standing, 38 paid allowances for summer work and 41 concerns gave recruits extra pay for related military experience.

Code of Ethics: The code, titled "Principles and Practices of College Recruiting," is being submitted for ratification this fall to the membership of seven regional placement associations representing colleges and employers.

The present code had its beginning in '56, when several college placement associations appointed committees of college and employer representatives to study the growing problem of questionable recruiting practices.

Midwest College Placement Assn., at its Sept. '56 meeting, was the first such group to adopt a new statement of recommended recruiting practices. The following May, the executive committee of Eastern College Placement Officers followed suit with a statement of its own.

At its meeting in the fall of '56, Council of the American Society for Engineering Education—which had developed a statement, "Ethics of Interviewing Procedure" in '48—accepted MCPA's statement in principle and directed its ethics committee to revise the statement for ASEE adoption.

Meanwhile, Manufacturing Chemists' Assn.'s industrial relations ad-

Talent Tips Compiled

Chemical process industries' personnel management men last week were examining a new booklet, "Shortage of Scientists," containing 50 ideas for stimulating the interest of young people in science and engineering careers. The ideas were the result of an industry-wide "Talent Scout Contest" sponsored by Victor Chemical Works (Chicago). Authors of the top 20 ideas were each given the opportunity by Victor to select a 1957 high school graduate to receive a four-year scholarship.

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Reliance Relgrit abrasive embedded grating and treads provide the only truly non-skid surface. Even when covered with oil, Relgrit has a coefficient of friction 30% greater than dry steel grating. Wear tests have shown that the abrasive surface will wear longer than steel, and retain its non-skid quality during its entire service life.

The top surfaces of the bearing and cross bars have ⅛" deep V-grooves in which is embedded abrasive aluminum oxide grains in a hard resin. The material is not affected by water, oil, gasoline, greases, or commonly used acids, alkalis and other chemicals. Together with its wear resistance, this gives Relgrit a long service life.

If you have floors or stairs which become oily, greasy, wet, or slick from any cause, Relgrit can provide safe footing at very low cost. Write on your letterhead for free sample and literature, or ask for our representative to call. It will pay you to investigate this remarkable new grating.

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1956-57 Recruiting: The Graduates Were Selective

Source: Midwest College Placement Assn. survey

Practices and Results	262 Business and Industrial Companies	52 Chemical, Petroleum and Allied Products Companies
Percent of job openings filled:		
technical jobs	66%	70%
nontechnical jobs	80%	88%
Ratio of acceptances to job offers:		
technical jobs	29%	34%
nontechnical jobs	60%	65%
Average monthly starting salaries:		
technical graduates (BS)	$436	$455
nontechnical graduates (BS/BA)	$391	$407
Starting salary range ($/month):		
technical graduates	$300-525	$414-500
nontechnical graduates	$300-500	$350-475
Average monthly starting salaries companies expect to pay in 1958:		
technical graduates	$450	$470
nontechnical graduates	$395	$421

visory committee prepared a statement of recruiting principles, which was approved by MCA's board of directors. Authority was granted to the committee to work with other organizations in the preparation of a generally acceptable statement.

Chamber of Commerce Aid: At this point, June '57, "to encourage broad action and to avoid the confusion of multiple statements," two steps were taken:

- U.S. Chamber of Commerce held a meeting of selected representatives from business, government and education "to crystallize their points of view" and to develop a tentative statement.
- Later in June, following the annual meeting of the College Placement Council, a subcommittee from the Chamber of Commerce meeting met at Columbus, O., with representatives of the seven regional placement associations.

From the Columbus meeting came the statement, "Principles and Practices of College Recruiting," which was subsequently approved by the executive committee of the regional placement associations.

Objectives of the code: to promote a wise and responsible choice of a career by the student, to foster in the student (as well as the employer) a high standard of integrity, to develop in the student an attitude of personal responsibility for his own career, to minimize interference with the education process of the college, and to encourage the individual's further education.

In addition to certain principles set down for employers (*table, p.* 27), the code calls for ethical practices on the part of students and colleges. But foremost for all three groups is the recommendation that all dealings between interviewer and student "be made in good faith and with sincere intention of honoring each acceptance of employment."

Clearing the way for scoring plays...

. . . is the blocker's job. Without him, the ball carrier is seriously handicapped. The blocker is the "silent partner" of the man who makes the scores.

Industry, too, has "silent partners"—firms like PICCO, who help clear the path to sales success for their customers by providing technical skill and dependable materials used in the formulation of a wide variety of products.

For example, there is **Piccopale Resin,** a petroleum polymer, having wide compatibility with other raw materials used by the compounding industries. Its consistently uniform high quality, and its large, ready availability make **Piccopale Resin** the ideal "silent partner" to use as a starting raw material in creating new products, new markets, and greater profits.

Piccopale Resin engineered to unique physical and chemical properties, is produced in a variety of grades. May we assist you in applying this versatile "silent partner" to your production needs?

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ADMINISTRATION

UNITED PRESS

Judge Edelstein: Found international monopoly in toilet-goods trading.

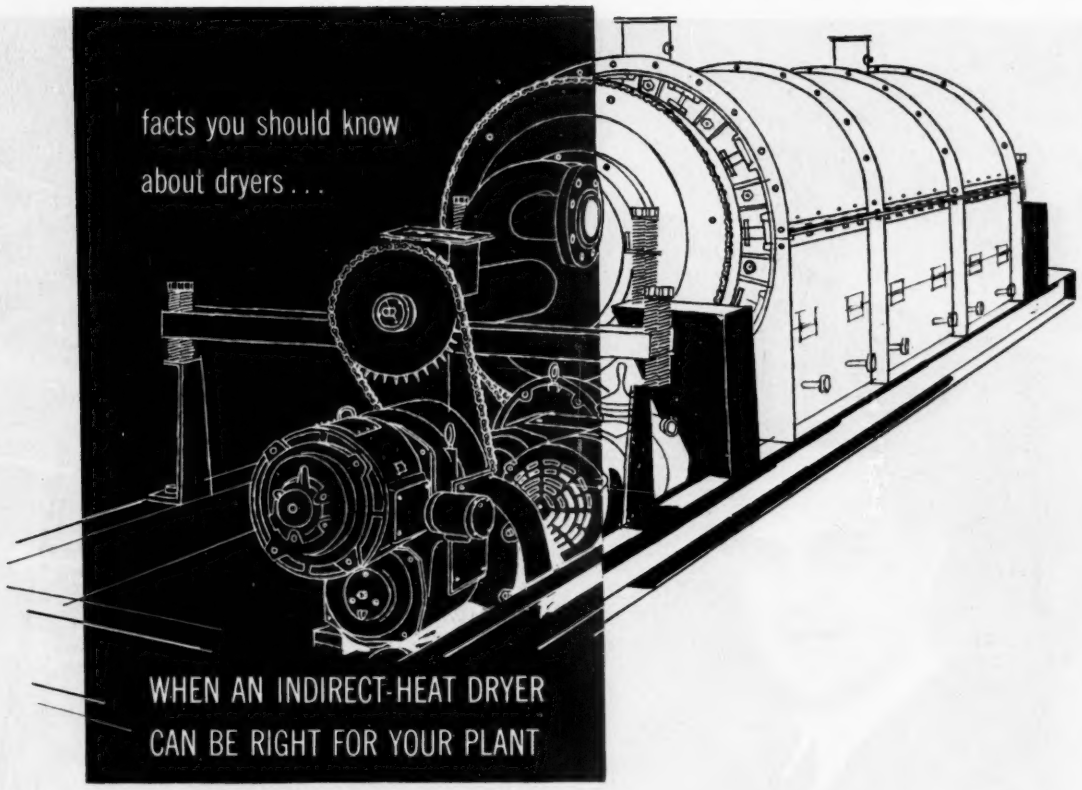
LEGAL

Toilet Goods Trust Busted: U.S. importers are expected to gain considerable freedom in the importation of French-made toilet goods as a result of recent federal court decisions in antitrust suits against three U.S. perfume companies having European connections (*CW, July* 3, '54, *p.* 24).

U.S. district court for the southern district of New York has recently ruled that Guerlain, Parfums Corday and Lanvin Parfums violated Section 2 of the Sherman Act by monopolizing the importation of the products of their affiliated companies in France, thus keeping U.S. prices "substantially higher" than those in foreign countries. The toilet goods were marketed under exclusive sales contracts between the French manufacturers and the U.S. concerns.

In his decision, Federal Judge David Edelstein said: "I have found as a fact in each case beyond any gnawing doubt that the defendant and its French counterpart constitute a single international enterprise. . . . What is under attack is in fact an attempt, successfully executed, by each company, as part of a single international business enterprise, to limit the resale of its products for the express purpose of excluding competition and controlling prices."

Control of imports was made possible in part by the Tariff Act, which in effect, prevented other U.S. importers from competing in the U.S. against



For over 55 years, Louisville Dryers have been solving industry's drying problems and effecting marked economies. The records of this experience can often be applied to specific cases, possibly yours. For example . . .

Q. *My material is a filter cake, practically all minus 325 mesh, and must not contact furnace gases. It can be heated to 500° F. at least, without injury. What type of dryer would do the job best?*

A. You might consider using a direct-heat rotary dryer that utilizes clean, heated air as the drying medium—air heated by steam coils or a gas or oil fired heat exchanger. However, this introduces a considerable dust collection problem. Besides, from a standpoint of capacity, it is inefficient as well as from a heat-cost standpoint. This makes it unduly expensive. Therefore, a type of indirect-heat rotary dryer is indicated which would greatly reduce both the dust problem and the heat cost.

Q. *What is meant by an indirect-heat rotary dryer?*

A. One in which the material to be dried is warmed by contact with the heated metal surfaces, which in turn are heated by the medium used (usually furnace gases or steam). Those using furnace gases are called "indirect fire dryers". Atmospheric and vacuum drum dryers are examples of steam-heated indirect dryers, but the type in greatest use is the steam tube dryer. This is often referred to as the "Louisville Type" because of the thousands of Louisville Steam Tube Dryers built during the past 55 years.

Q. *How does an indirect-heat dryer minimize the dust problem?*

A. In an indirect-heat dryer, only enough air is admitted to carry off the evaporated moisture. Thus, the air has nothing to do with the heating of the material. Generally, this low air velocity results in insignificant dust loss.

Q. *How does this differ from the operation of a direct-heat dryer?*

A. In direct-heat dryers, the hot air furnishes the heat for drying besides removing the evaporated moisture. The amount needed to supply the necessary heat results in a sufficiently high velocity through the dryer to carry out an excessive amount of fine material particles.

Q. *It seems I need an indirect-heat dryer. How can I get competent advice and more information regarding my particular requirements?*

A. The Louisville Dryer engineering staff will be glad to analyze your requirements, arrange for necessary pilot plant tests, and submit an unbiased recommendation accompanied by estimated costs. You incur no obligation by using this service.

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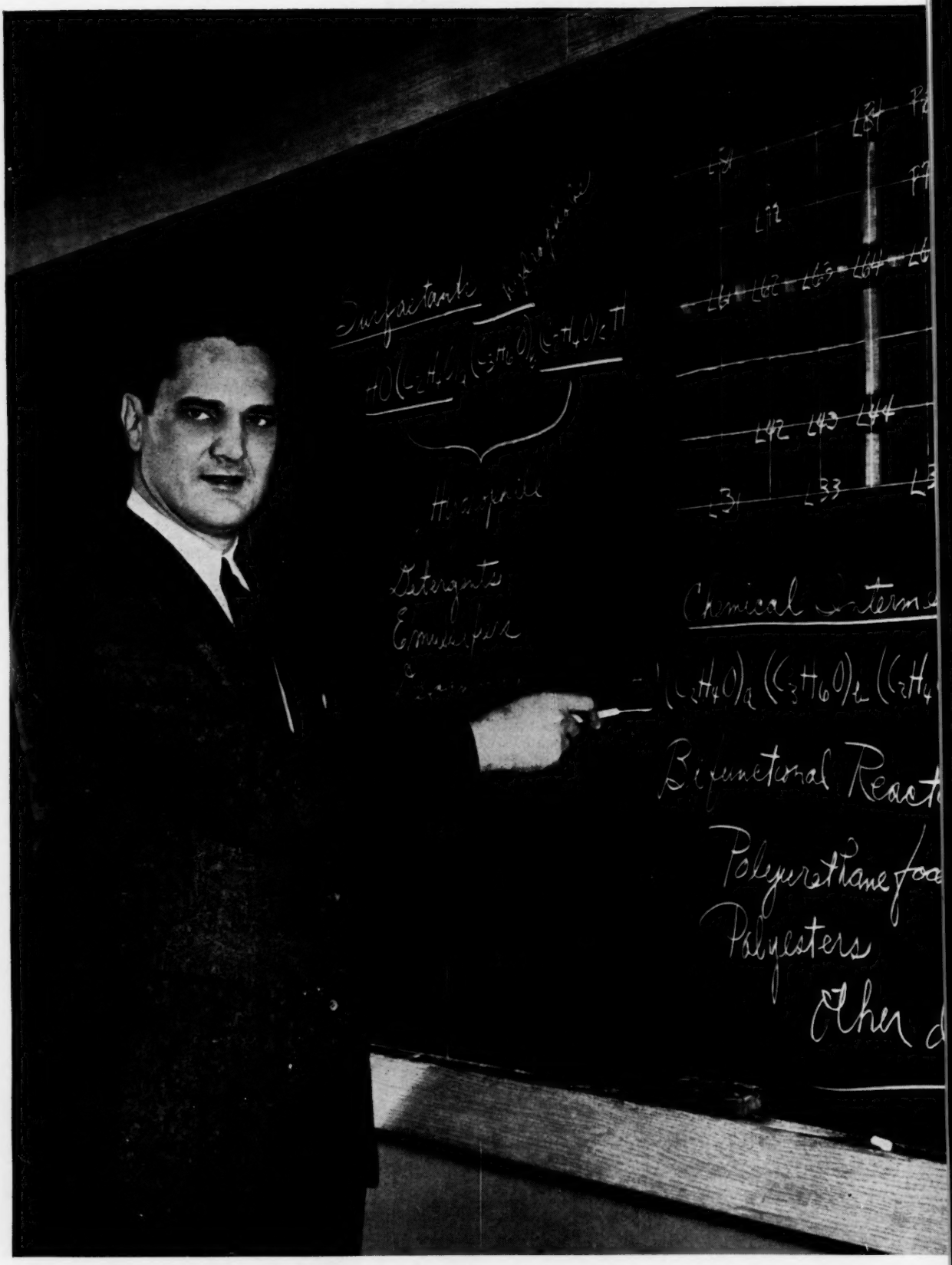
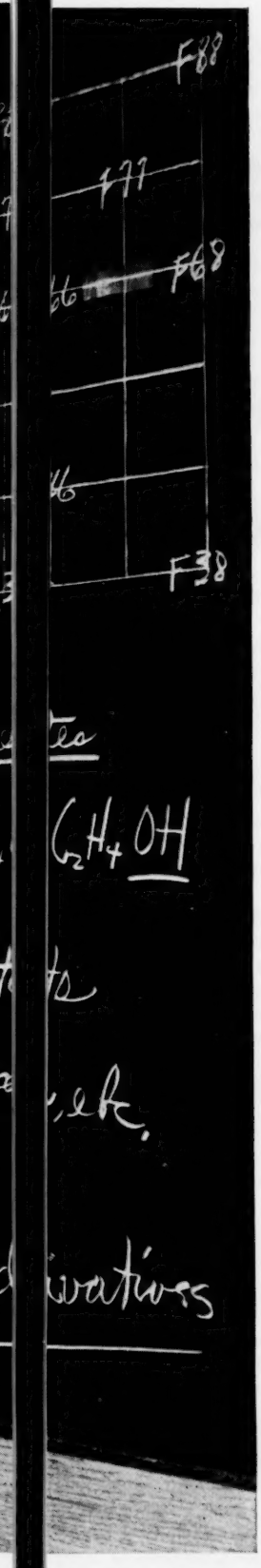
In Canada: Canadian Locomotive Company, Ltd., Kingston, Ontario, Canada
General Offices: 135 S. La Salle Street, Chicago 90, Illinois



WYANDOTTE CHEMICALS CORPORATION, WYANDOTTE,



"ONLY A THOROUGH EVALUATION CAN GIVE YOU THE FULL SCOPE OF WHAT THE PLURONIC BLOCK-POLYMERS CAN DO FOR YOU"

—reports Dr. J. William Zabor, Wyandotte Director of Research

"If any PLURONIC® were an ordinary surfactant, it would be a relatively simple matter for us to tell you how it would compare with what you are using. But the PLURONICS are not. They constitute a series of new and different chemicals—the first commercial examples of a block-polymer. And the PLURONICS are 100% active in *all* forms: liquids of varying viscosities, pastes, flakes, powders, and cast solids.

"Each PLURONIC is one of a series. The simplified structure may be expressed as:

$$HO(C_2H_4O)_a(C_3H_6O)_b(C_2H_4O)_cH$$

"As may be seen, the system presented here has the outstanding advantage of inherent flexibility. The total molecular weight of the hydrophobic base and the hydrophilic portion can be varied in small increments over the wide range of 1,000 to 11,000. It is therefore possible to prepare a product to meet almost any requirement of molecular weight or of hydrophobic-hydrophilic balance. When studying the PLURONICS' chemical possibilities, they may be recognized as polyols or difunctional polyethers.

"In considering the PLURONICS' surface-active properties, it is easy to evaluate the various grades with our Grid. You can do it by pencil-o-metric* research, for the PLURONICS are plotted on the Grid by molecular weight, and hydrophobic-hydrophilic ratio. By observing the property trends shown on the Grid, you can concentrate on those PLURONIC grades which offer the most promise for you. The Grid does away with random evaluation of unrelated surfactants . . . makes it possible for you to predict the characteristics you can get with a PLURONIC or a combination of the PLURONICS in a formulation; thereby the performance of the product itself may be predetermined.

"If you do not have a PLURONIC Grid, write for your copy today. If you do have one, remember: recent additions to the PLURONIC series . . . important new application developments . . . make it advantageous for you to keep in touch with us. Samples are, of course, available upon request for your evaluation.

"With the PLURONICS, you may develop a product that is new, different, exclusive (with you), and highly profitable. Remember, they have found application in many varied fields already, including cosmetics, formulated detergents, paint, petroleum, plasticizing, and water treating, to name a few. You have many things to gain in giving the PLURONICS consideration."

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ADMINISTRATION

the defendant companies. "Such exclusion, if it were accomplished by agreement would violate the antitrust act," Judge Edelstein said.

The Tariff Act prohibits importation into the U.S. of any merchandise of foreign manufacture that bears a trademark owned by a citizen of the U.S., or by a corporation or association created or organized within the U.S., unless written consent of the owner of the trademark is produced at time of entry.

IDEAS

Executives' Health: There's no evidence to suggest that management personnel are any less healthy than other workers, reports Dr. Leo Wade, medical director of Esso Standard Oil Co. (New York), after a survey of 176 of the company's managerial personnel and a similar number of nonmanagement employees. Dr. Wade holds that a new kind of research is needed to accurately determine what factors in the top-management environment might affect health.

•

Films for Managers: Two new training and informational films for supervisors are ready for distribution. "Supervisory Problems in the Office"—produced for the National Office Management Assn. (Willow Grove, Pa.) by the Text Film Dept. of McGraw-Hill Book Co.—illustrates typical problem situations in employee relations. "You and Labor Law"—a 30-minute color-and-sound slide film produced by Transfilm for Employers Labor Relations Information Committee (New York)—describes the history, purposes and principles of U.S. labor laws.

LABOR

Paint Wage Hearing: The Labor Dept.'s Division of Public Contracts is scheduled to hold a public hearing at 10 a.m., Oct. 1 in Washington on minimum wage rates under the Walsh-Healey Public Contracts Act for the "paint, varnish and related products" industry. One of the prime questions will be whether there should be a single rate determination for the entire country or separate determinations for smaller geographic areas. Present minimum pay rates for government contractors in this industry

WIDE WORLD

Whitehouse: For 'adequate' social security and more liberal pensions.

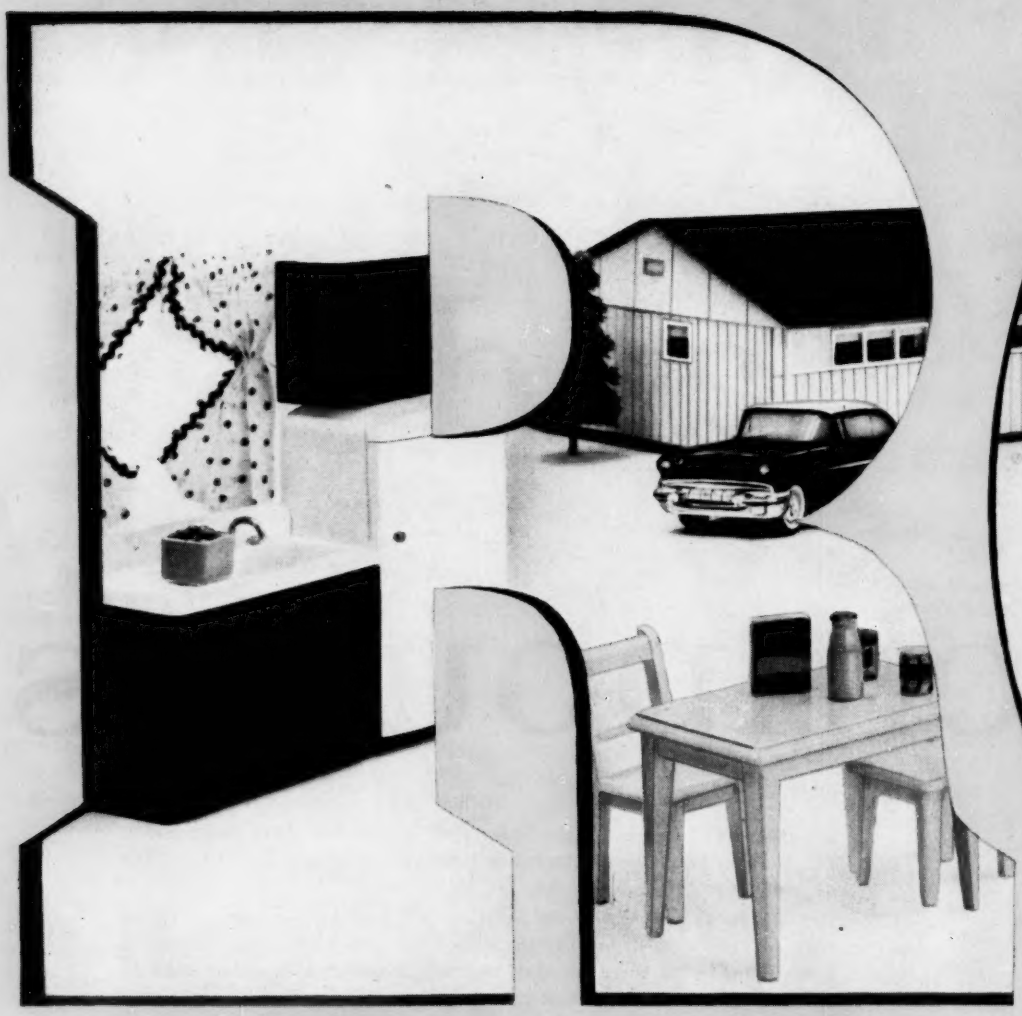
are $1/hour in some states, $1.05 in others. Also to be discussed: the government's proposed new definition for this industry.

•

IUD Pension Parley: A conference likely to influence labor unions' 1957-'58 bargaining on retirement plans was held in Washington recently by AFL-CIO's Industrial Union Dept. Both of AFL-CIO's major chemical unions are affiliated with IUD. Some 70 pension and welfare specialists for IUD unions attending the three-day meeting were briefed on points to watch in analyzing pension programs proposed by management. In his opening address, IUD Director Albert Whitehouse called on organized labor to work for "adequate" old-age insurance under the Social Security laws, as well as increased benefits through private pension agreements.

•

New Pay Pacts: District 50, United Mine Workers, has been prominent in recent chemical industry wage agreements. At Damascus, Va., American Cyanamid is granting wage increases ranging from 5 to 15¢/hour under a new two-year contract with the local. Feature: wage reopener scheduled for Sept. '58. At Hamilton, Ont., a one-year agreement between District 50 and Canadian Industries Ltd. gives employees wage boosts of 15, 18 and 23¢/hour. And at Cordova, Ala., Vulcan Asphalt Refining Co. employees—who switched to District 50



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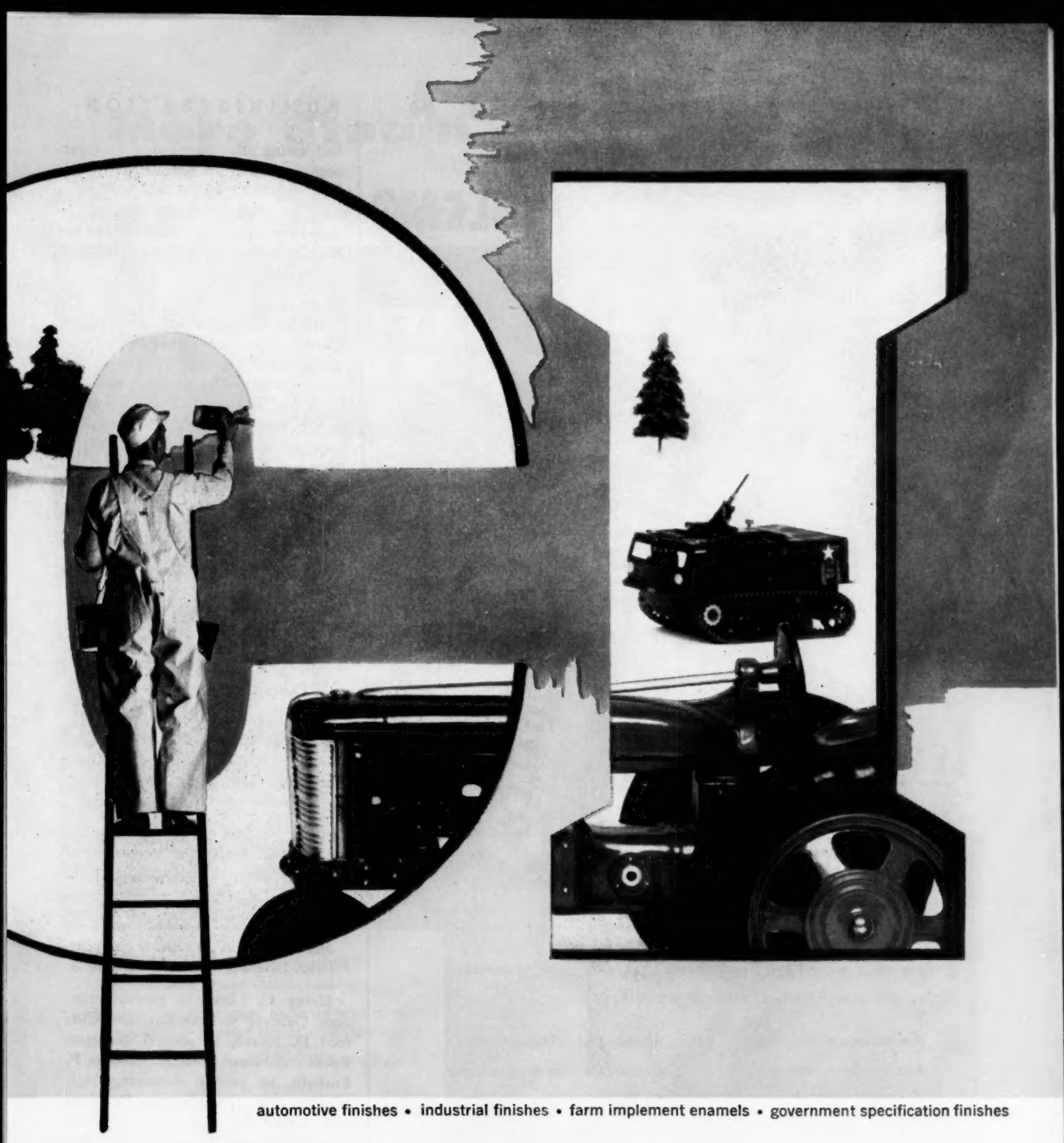
LOOK FOR IMPROVED PAINT PRODUCTS

THROUGH RCI CREATIVE CHEMISTRY



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Today, Reichhold makes hundreds of resins for surface coatings. Among the newest are RCI Isophthalic Acid Alkyds, Melamine-Formaldehyde Resins, Epoxies, and PVAc and Alkyd Emulsions.

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Maleic Anhydride • Sebacic Acid • Sodium Sulfite • Pentaerythritol • Pentachlorophenol • Sulfuric Acid

ADMINISTRATION

last spring after bargaining by representatives of Oil, Chemical & Atomic Workers (AFL-CIO) had brought a 9¢/hour offer from the company—now have a pact calling for an 18¢ per hour general wage increase, plus various fringe benefits.

•

OCAW's Reduction in Force: There's a possibility that more locals —like the one at Cordova (*see p. 36*) —may become dissatisfied with OCAW's "servicing." That's one prospect of that union's recent cutback in number of field workers. OCAW President O. A. Knight has laid off the five international representatives with lowest seniority, leaving 105 on the payroll. Reason: operating expenses are up; members are not yet willing to pay higher dues.

KEY CHANGES

Francis J. Sergeys, to vice-president in charge of development, Research and Development Division, W. R. Grace & Co. (New York).

John W. Buskie, to vice-president, Tennessee Products & Chemical Corp. (Nashville, Tenn.), division of Merritt-Chapman & Scott Corp. (New York).

Ernest E. Holdman, to vice-president and general manager, Heyden Newport International, division of Heyden Newport Chemical Corp.

James P. Okie, to general manager, Plastics Division, Diamond Alkali Co.

Henry C. Little, to general manager, General Services Division; **Clifford D. Siverd,** to general manager, Farm and Home Division; **Thomas P. Forbath,** to general manager, Engineering and Construction Division; and **Alfred L. Peiker,** to director, Stamford Research Laboratories, Research Division; all of American Cyanamid Co. (New York).

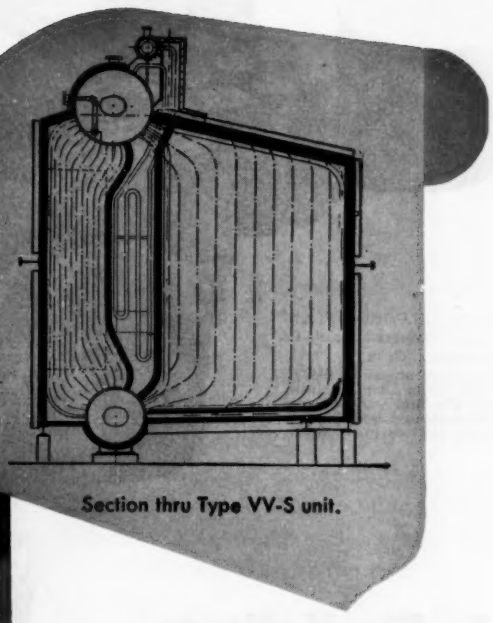
J. K. Lindsay, to president and general manager, Merrell-National Laboratories, overseas ethical drug division of Vick Chemical Co. (New York).

DIED

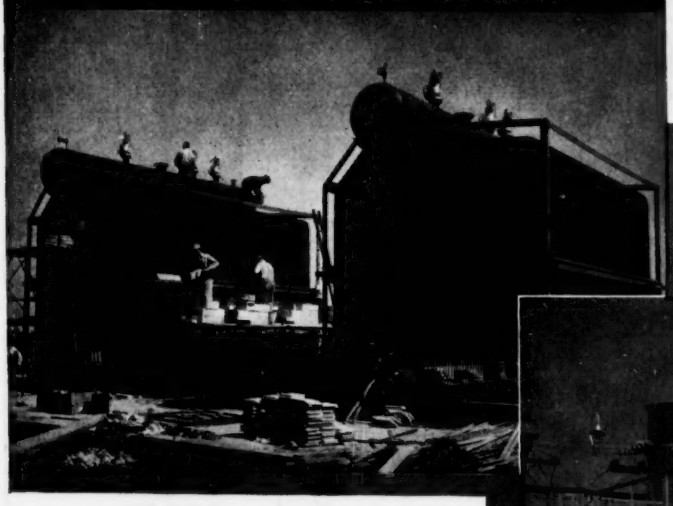
Forrest E. Benson, 60, vice-president, Archer-Daniels-Midland Co. (Minneapolis), at Mound, Minn.

More Steam with Fewer Dollars

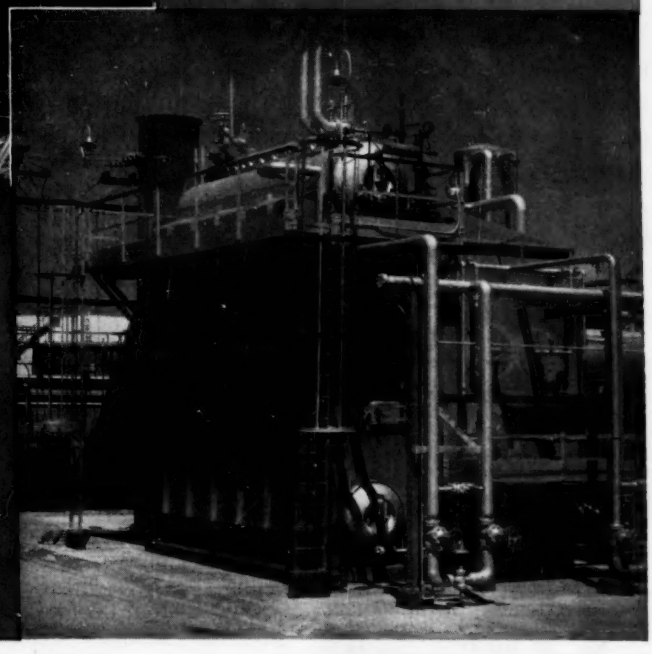
Vogt TYPE VV-S STEAM GENERATORS



Section thru Type VV-S unit.



Two 50,000 #/hr. units under erection at an Air Force Base.



A 65,000 #/hr. unit in a Texas Petroleum Refinery

- ★ Headerless construction for full unrestricted water circulation.
- ★ Large water storage capacity and correspondingly greater steam relieving space.
- ★ Long, narrow furnace ideal for oil or gas fuel.
- ★ Completely steel encased for "out-in-the-open" operation.
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FATTY ALCOHOL PLANT
ARCHER-DANIELS-MIDLAND CO.
ASHTABULA, OHIO
All equipment was installed by Cunningham-Limp Company also. The large warehouse and office building (right) is a C/L design and construct project.

A Building Experience You can come by... *Easily!*

You will readily appreciate, being in the business, the considerable experience it takes to construct a chemical processing plant such as this. Especially so, when you are told that the complete responsibility, even for the installation of the processing equipment, was assumed by the builder. Such building experience can be the means by which you secure a full dollar's value from every dollar you budget for construction. Possession of it by C/L should certainly demonstrate to you that this company is fully capable of designing, engineering and building most any project you are planning—anywhere.

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- **Site selection—planning—development**
- **Plant layout**
- **Machinery moving**
- **Materials handling methods and systems**
- **Equipment design—purchase—installation**
- **Building design and engineering**
- **Building construction, including**
  - **Industrial plants**
  - **Warehouses**
  - **Research laboratories**
  - **Chemical process plants**
  - **TV and Radio facilities**
  - **Power plants**
  - **Commercial buildings**
  - **Railroad and Utility facilities**

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Do you need a new processing plant—a new factory—or office building—or warehouse—or additions to your present facilities? Whatever it is—you will find in Cunningham-Limp Company the abilities and experience to design, engineer and build it for you, and a zeal to assume the entire responsibility within our organization. And perhaps the fact that 90% of our volume comes from old customers* will convince you that we are notably capable of doing so.

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* * * * * *

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*** In the building business, especially, repeat orders indicate customer satisfaction. Listed here are several of the well-known corporations which have found it profitable to use C/L's design-engineer-build services at two or more "nationwide" locations. The complete list is available, of course.**

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Ashtabula, Ohio
Mankato, Minn.
Wyandotte, Mich.

CHRYSLER CORPORATION
Detroit, Mich.
Rye, N. Y.
Skokie, Ill.

EX-CELL-O CORPORATION
Detroit, Mich.
Lima, Ohio

FORD MOTOR COMPANY
*Birmingham, Mich.
*Indianapolis, Ind.
Lima, Ohio
Livonia, Mich.
Monroe, Mich.
*St. Louis, Mo.
Wayne, Mich.

STORER BROADCASTING CO.
Atlanta, Ga.
Birmingham, Ala.
Detroit, Mich.
Miami, Fla.

SUNSHINE BISCUITS, INC.
Detroit, Mich.
Grafton, Ohio
Jeffersonville, Ind.
Omaha, Nebr.
Pittsburgh, Pa.

***designed by others**

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Washington
Newsletter

CHEMICAL WEEK
September 28, 1957

Coal-tar chemical producers must show more hustle to hold onto present tariff protections against imports. They must meet an Oct. 22 deadline for petitioning the Treasury Dept. to exempt from the new uniform customs valuation procedure the chemicals they produce. There are currently only 268 chemical materials on the list of products exempted from the new valuation method on grounds that the use of the method would result in a tariff cut of 5% or more.

Treasury officials insist that the Oct. 22 deadline is firm; petitions for additions to the exempt list "absolutely will not be considered" if they arrive after that date, regardless of their merit, Treasury says. Though the department is cognizant that many chemical firms and organizations are gathering data, it's frankly worried that some other producers who could make good cases for keeping present tariff valuation procedures may be moving too slowly in preparing data needed to file a petition.

So far, the government has received only one petition for an addition to the exempt list. That one came from a small Midwest firm, and covers just one product. Officials have had a few inquiries from others—but nowhere near the volume they expected. Appeals to qualify several hundred additional chemical products for exemption were anticipated.

This is the last chance to gain exemption from tariff cuts under the new valuation method. Customs officials, after considering petitions, will publish a revised list of exempt items, probably within a few months. That list will be permanent—contrary to an apparent widespread belief that Congress ordered subsequent revisions of the list in 1959 and '60. Consequently, items that don't make the list this year lose all chance of exemption in the future.

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Washington will encourage more U. S. chemical investment abroad, since Congress cut the foreign economic aid program for industrial development in friendly countries at the very time that demands for industrialization are growing. These demands are especially heavy in Asia, Africa and the Middle East.

Foreign aid has financed an estimated $50-60 million worth of projects that private investors would have been willing to go into, if the interested foreign governments would have consented. With Congress drawing the foreign aid purse strings tighter, you can expect ICA to be—of necessity—a little firmer now in recommending that private investors be let in.

ICA, it should be noted, has turned down some proposals on grounds that private money and know-how were available.

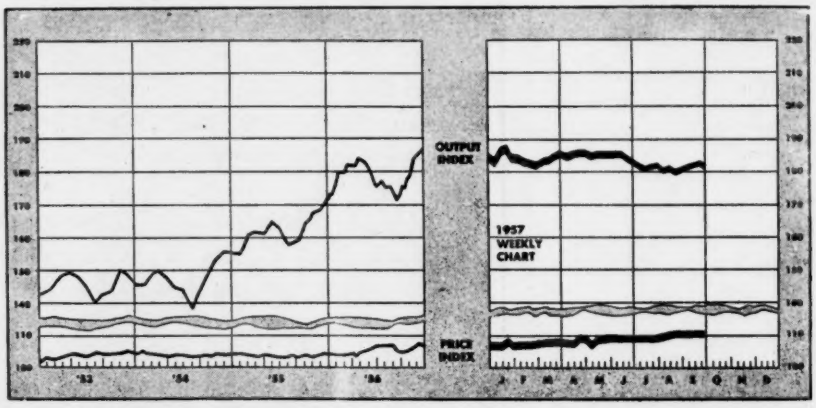
India, for example, wanted a carbon black plant. ICA approached a leading U. S. manufacturer, which said it would be glad to build the

plant. But the Indian market for carbon black is very small, and the manufacturer asked for very high tariff protection. ICA dropped the idea of putting any money into the plant.

The Indians also asked for ICA help in drafting plans for a state-owned aluminum plant. ICA discovered that Reynolds Aluminum was willing to do the job, that the World Bank would consider picking up the check for the accompanying power facilities, and that the Export-Import Bank would lend Reynolds up to 60% of its investment. India has not yet accepted this proposal.

Koppers is ready to go into Pakistan, to spend $80 million to build two fertilizer plants. The Pakistani Investment Development Corp., however, wants ICA to put up the full $80 million for state-owned and state-operated plants. ICA is saying no, expecting, in the end, that Koppers will get the job.

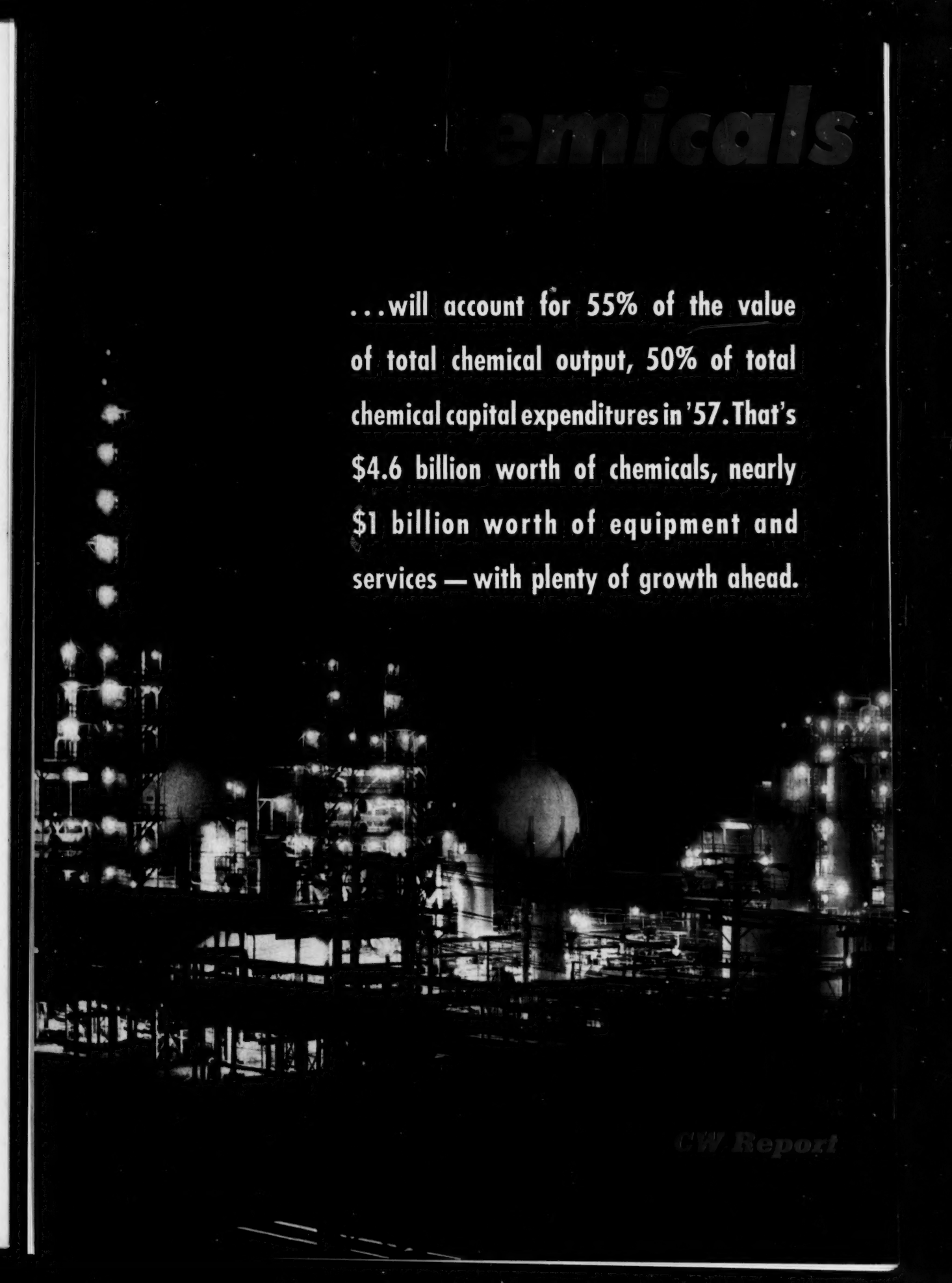
Washington is trying to maintain a delicate balance in this reappraisal of foreign aid. There are deep inner doubts that the socialist or neutralist nations—the very ones that need help most—can or will change their policies quickly enough to give private investment the essential incentive. And that raises the problem that gives the U. S. government a king-size headache: If, assuming continuation of current budget limitations, it cannot give substantial economic assistance to underdeveloped nations, what can it do to keep them from communism?



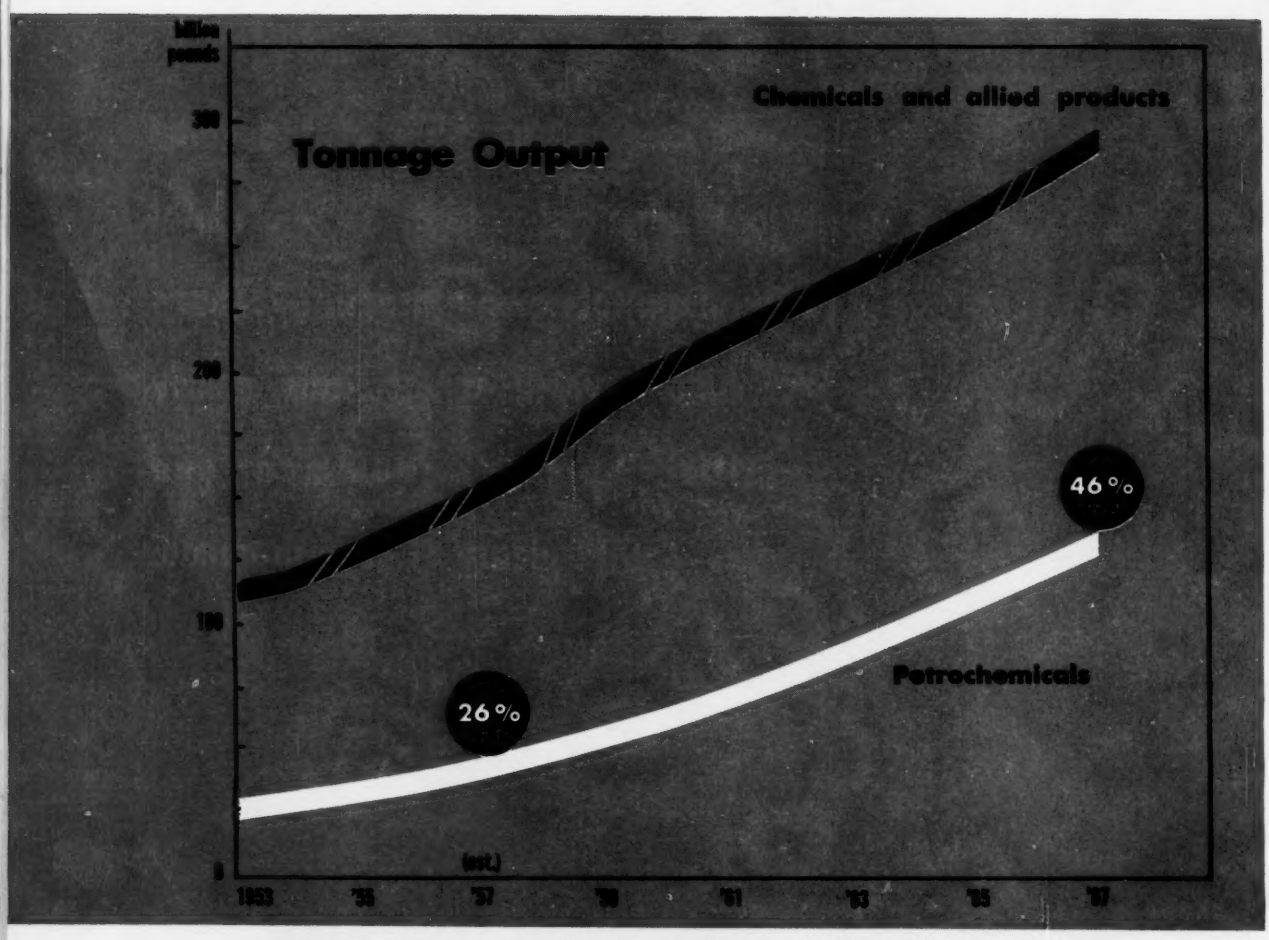
Business Indicators

WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	185.0	182.5	174.2
Chemical Week wholesale price index (1947=100)	111.1	110.9	105.4
Stock price index of 11 chemical companies (Standard & Poor's Corp.)	42.36	41.92	45.59

MONTHLY Wholesale Prices (Index 1947-1949=100)	Latest Month	Preceding Month	Year Ago
All commodities (other than farm and foods)	125.9	125.7	122.5
Chemicals and allied products	109.7	109.5	107.3
Industrial chemicals	123.6	123.5	122.1


...will account for 55% of the value of total chemical output, 50% of total chemical capital expenditures in '57. That's $4.6 billion worth of chemicals, nearly $1 billion worth of equipment and services — with plenty of growth ahead.
CW Report

By three measures, the



Tonnage output of petrochemicals now is 26% of the total tonnage output of the CPI. By 1967, it will jump to 46%.

In the overlap of the chemical and petroleum industries stands a $4.6-billion/year petrochemicals business that's destined to hit $14 billion/year in about 10 years.

Petrochemical products account for a slim, but important, portion of the total petroleum industry output—less than 2%. But for the chemical industry, chemicals from petroleum and natural gas play a major role now and are destined to become even more important.

Petrochemicals today account for a lusty 26% of the total tonnage output of chemicals (some 156 billion lbs. this year) and an even more impressive 55% of total chemical output value ($8.4 billion in '57).

Moreover, these percentages of petrochemicals are increasing at a steady clip. By '67, petrochemicals will represent a good 46% of total chemical output tonnage and 71% of all chemical output value.

In terms of capital outlays, the petrochemical segments of both industries will be spending at a rate of $2.2 billion/year for plant and equipment by '67. That's about $1.4 billion/year more than the $0.9 billion being spent currently by petrochemicals producers, who are sustaining a near-phenomenal growth rate. For a breakdown of capital spending, see table on pp. 50, 51.

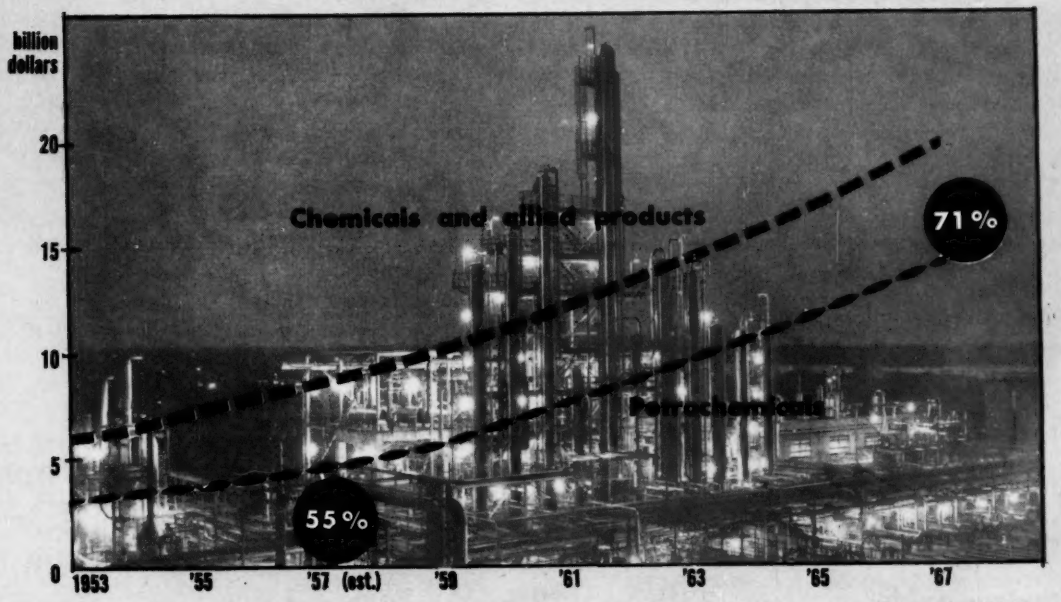
Petrochemicals growth has been pegged conservatively at about 15% annually, compared with 10% for the chemical industry as a whole and 3% for all industry.

Here's how that growth has progressed: in '52, there

fastest-growing member of the CPI

Output Value

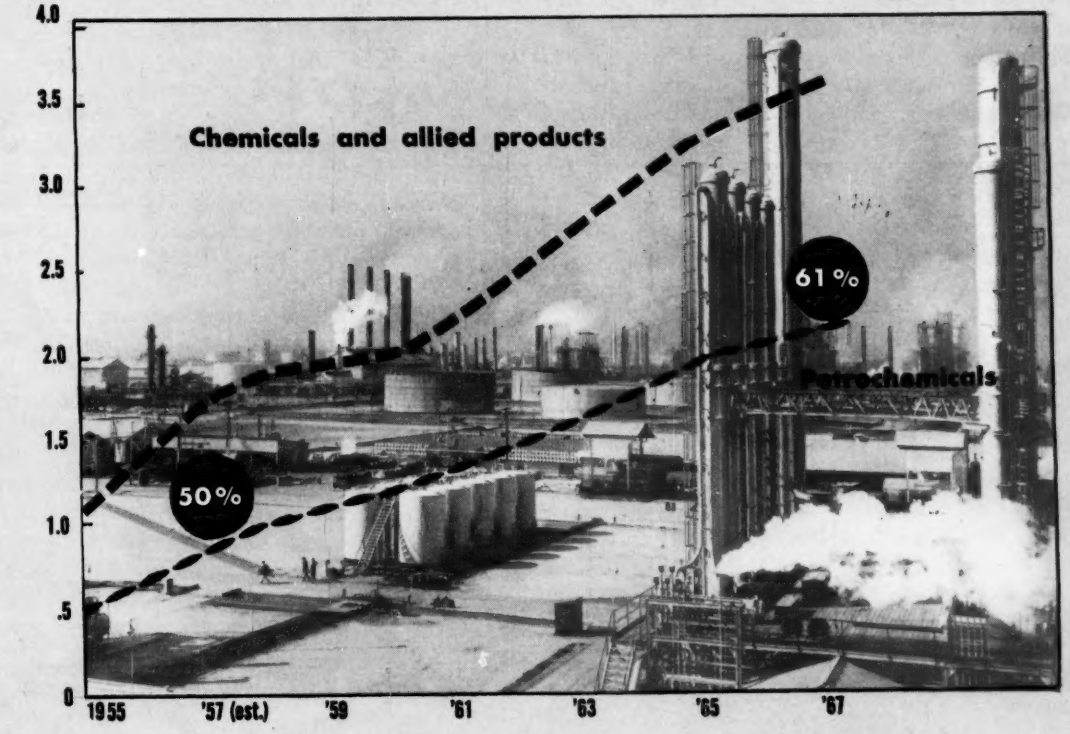
Petrochemical output, valued at $4.6 billion this year, is 55% of the total value of the CPI's output. It will be 71% in '67.



Capital Spending

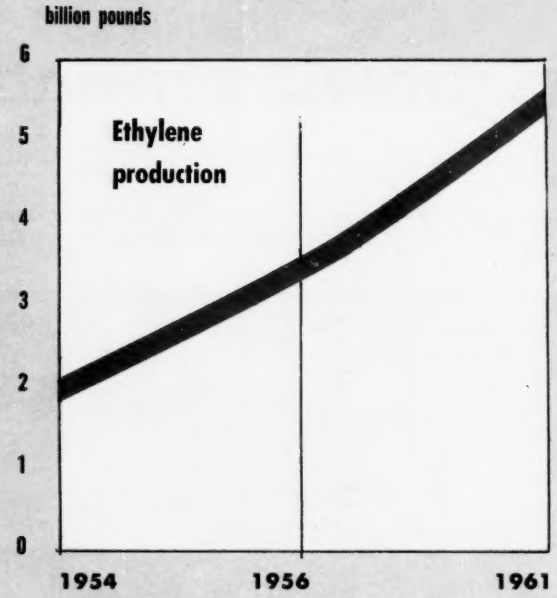
billion dollars

Petrochemical capital expenditures now account for 50% of all capital spending by the chemical process industries.



No Letup for Ethylene

Ethylene production will continue to grow fast . . .

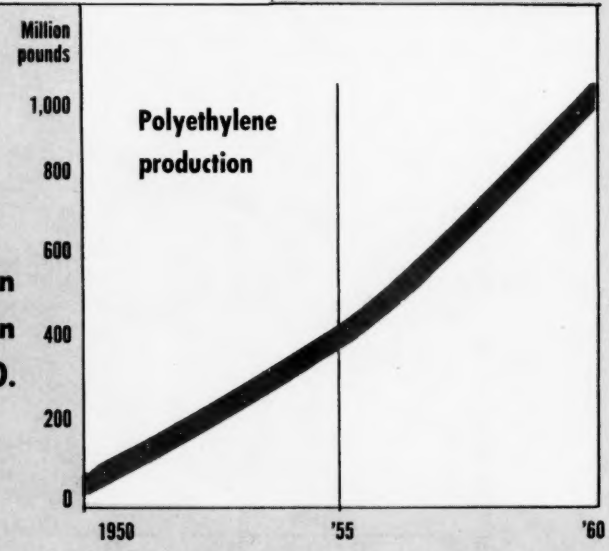


Ethylene consumption

	1954	1956	1961
Ethyl alcohol	30%	22%	19%
Ethylene chloride	10%	8%	7%
Ethylene dichloride	7%	5%	5%
Ethylene oxide	25%	29%	26%
Polyethylene	**10%**	**17%**	**26%**
Styrene	11%	10%	9%
Others	7%	9%	8%

. . while consumption shifts strongly in favor of polyethylene.

Polyethylene production is heading for 1 billion lbs./year by 1960.



were 70 separate companies in petrochemicals production, with 130 plants operating, under construction or planned; last year ('56), the number of petrochemical-producing companies had swelled to 197, plants to 362.

This year, some 206 companies can be dubbed "petrochemicals" producers—66 of them petroleum firms and their subsidiaries, 76 petrochemicals enterprises exclusively, 56 chemical firms and eight joint ventures between petroleum and chemical companies.

Operating petrochemicals plants, plants under construction or planned now number 409. Since last year, there have been 73 projects completed, 74 brand-new plants under construction or planned and 55 expansions under way or planned at existing facilities.

Total petrochemicals operations in the U. S. represent a capitalization of some $4-5 billion, with another $1 billion-plus for current expansions and new plant construction. By '60, the capital investment will have grown to $8 billion.

In this generally rosy long-term outlook for petrochemicals, a few gray streaks stand out.

For example, one large petrochemicals company claims that expansion in petrochemicals production has now reached a temporary plateau. Profits, he claims, must be made at 65-75% operating capacity. With labor and raw-materials costs running high, overcapacity is currently squeezing down product prices. Phthalic anhydride, butadiene and ammonia producers especially can attest to this.

Generally, the overcapacity situation is not so disheartening as might appear. Cyclic overcapacity is characteristic of chemical production. Extra capacity is only a temporary problem as long as expanding markets are in prospect.

Because high initial investment costs are typical of both chemical and petrochemical industries, markets must be sizable to justify large-scale operations. For that reason, all petrochemicals producers today must turn out large volumes of liquids and gases to keep operating costs trim.

Contrary to popular opinion, profits in the petrochemicals business are not as spectacular as might be expected these days. Net income/dollar of net worth runs something like 17.5 in chemical industry, but only 16.2 for petrochemicals producers. These figures, however, are far ahead of all-manufacturing, which stacks up at 14.7.

All contenders in the field today are pushing their facilities, manpower and capital resources hard to get the highest possible return on investment.

So much for petrochemicals as a whole. What's happening specifically in some basic sectors of the business?

ETHYLENE

Ethylene is still, by far, the brightest spot in the big petrochemicals picture.

This year, ethylene consumption is figured at some 4 billion lbs., with 1.4 billion lbs./year more to come by '61. The major portion of ethylene production—29%—goes into ethylene oxide manufacture; ethanol takes 22% of ethylene output and polyethylene, 17%.

Polyethylene, however, has been making such big tonnage gains that by '61 polyethylene is expected to rank with ethylene oxide as a consumer of ethylene; each will take 26% of all ethylene produced. Ethyl alcohol will slip off to third place at 19%.

In terms of tonnages, this means that by '61 ethylene oxide and polyethylene will each take some 1.4 billion lbs. of ethylene; ethanol will account for another 1 billion lbs.; styrene, 480 million lbs.; ethyl chloride, 400 million lbs.; ethylene dichloride, 250 million lbs.

The bulk of ethylene production now is for captive use, but pipeline delivery to customers is increasing steadily as new capacity comes onstream. Last year, pipeline sales of ethylene totaled 594 million lbs.

Ethylene oxide: Some 60% of all ethylene oxide production ends up as ethylene glycol antifreeze. Probably over one-half of today's ethylene oxide production is by direct oxidation, which is easing out the chlorhydrin process except where economic chlorine supplies are available to producers.

A round of recent expansions and new entries into ethylene oxide-glycol marketing means that capacity at 1.7 billion lbs. is ahead of current demands—under 1 billion lbs.

It's a sure bet that ethylene oxide-glycol producers will be stepping-up pressure on sales and research staffs to expand smaller promising outlets—polyglycols, glycol ethers, acrylonitrile, ethanolamines, and nonionic surface-active agents.

Polyethylene: Polyethylene demand continues to grow, although lagging well behind mushrooming U.S. capacity.

In '45, 5 million lbs of polyethylene were made. By '56, output had swelled to 560 million lbs. Outlook for '60 is close to 1 billion lbs.

Chemical Projects Associates, New York chemical consulting firm, forecasts a 2.6-billion-lbs./year polyethylene production rate by '75. At that clip, polyethylene resins alone will require some 2.9 billion lbs. of ethylene yearly.

Capacity is crowding 700 million lbs./year for conventional polyethylene and 180 million lbs. for low-pressure. By '60, conventional polyethylene capacity will be well over 800 million lbs., and for the newer high density, close to 600 million lbs.

An estimated 50-60% of all ethylene-derived polyethylene comes from captive monomer facilities.

(*Continued on p. 52*)

$900 million investment

percent breakdown	(million dollars)
Engineering costs	$207.0
Special equipment	90.0
Heat exchangers, cooling equipment	90.0
Pumps, compressors and drivers	90.0
Heaters, furnaces, etc.	72.0
Vessels, drums and towers	63.0
Trays and tower internals	54.0
Piping	54.0
Instruments	54.0
Insulation and fireproofing	27.0
Buildings and real estate	18.0
Electrical equipment[1]	18.0
Structures[2]	13.5
Tanks	13.5
Foundations	13.5
Yard cleaning, grading and paving, etc.	9.0
Machinery[3]	4.5
Elevator cranes and auto parts	4.5
Painting	4.5
	$900.0

[1]Excluding drivers [2]Excluding buildings
[3]Excluding pumps

23.0%	
10.0%	
10.0%	
10.0%	
8.0%	
7.0%	
6.0%	
6.0%	
6.0%	
3.0%	
2.0%	
2.0%	
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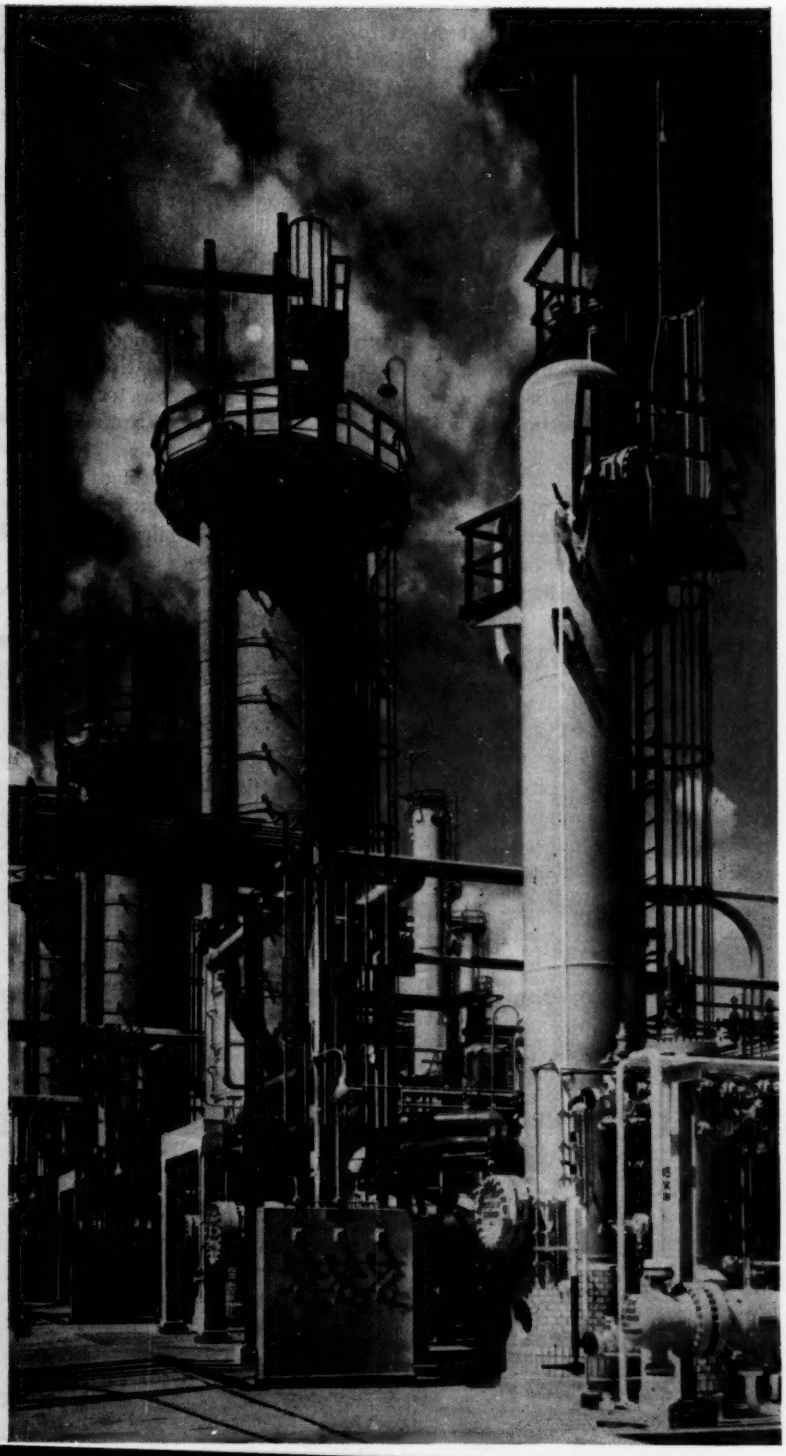

PROPYLENE

While ethylene now is the fastest-growing petrochemical intermediate, propylene may ultimately capture this distinction.

Production last year was reported at 1.4 billion lbs., roughly a 23% increase over the previous year. Most of this went into manufacture of isopropanol, propylene polymers (e.g., tetramer), allyl chloride, acrolein and cumene.

But more important than present-day markets for propylene is the potential demand for polypropylene. In Italy, Montecatini is pioneering the first commercial production of polypropylene molding powder and is pilot-planting polypropylene synthetic-fiber production.

A number of U. S. firms are evincing interest in polypropylenes made either by Montecatini's process or by independently developed technology. Right now, the whole field is shrouded by secrecy.

Low-pressure polyethylene producers (e.g., Carbide, Celanese, Hercules, Grace, Koppers and Phillips) are all potential commercial polypropylene producers.

If polypropylene clicks, a potential market of some 200 million lbs./year could shape up in 3 to 5 years.

BUTADIENE

Ever since the sale of the government's synthetic rubber facilities in '55, U. S. butadiene production capacity has been rapidly increasing. At 1.1-million-tons/year total capacity this year, producers expect to have some 300,000 tons of surplus butadiene on hand next year.

A surplus is no fundamental weakness, producers claim. They're counting on steadily rising domestic consumption of synthetic rubber to soon close the gap.

Aside from increased synthetic rubber demand, new uses hold promise for expanding butadiene markets. Nonrubber applications in making nylon, latex paints and resins, for example, now account for some 50,000 short tons/year, and are slated to run higher.

If anything, a butadiene oversupply should trigger increased research and development among producers.

A changing butadiene production pattern also is emerging. Whereas the chemical was formerly produced from butylenes, the emphasis today is on making it from n-butane (Houdry dehydrogenation process). One reason: butylenes are in steady demand as blending stock for high octane fuels.

AMMONIA

A gap of more than 1 million tons/year still exists between ammonia production capacity (estimated at 4.5 million tons in '57) and actual output (some 3.4 million tons in '56). Synthetic ammonia producers, however, are confident that in 3-4 years, overcapacity will no longer be axiomatic of their product's market situation.

Right now, ammonia expansions have reached a plateau after a round that has seen 92% added capacity brought on since '54. But ammonia's ups-and-downs are still closely tied to agricultural applications (76% of all ammonia tonnages go into fertilizer uses).

Agricultural demands had been tapering off until recently, when small gains were registered. Much of the boost was due to a 33% increase last year in export plant-nutrient shipments.

Direct application of ammonia to farm land, forests, lakes, ponds and highway landscaping promises to take up more of the slack between capacity and supply.

Currently, producers are also looking to industrial applications as a potential cure for overcapacity ills.

All of the industrial outlets for synthetic ammonia are in growth industries, such as chemicals, explosives, synthetic fibers, plastics, pulp and paper, metallurgy and petroleum refining, which now take 7%, 5%, 3%, 3%, 1.5%, 1% and 1%, respectively, of all ammonia produced. Industrial uses now account for roughly the 24% balance of the total consumption.

On the next seven pages →

Pocket Survey of Primary Petrochemicals

Here's a rundown of 28 basic petrochemical products and producers, plant locations, capacities and pertinent remarks on capital investments and expansions.

Data is not guaranteed to be complete for all products or all manufacturers. All information presented is based on company responses to a nationwide survey. Source: *Petroleum Processing*.

Primary Petrochemicals—Producers, Plant Locations, Capacities

Acetaldehyde

Company	Plant location	Capacity	Remarks
Amoco Chemicals Corp.	Brownsville, Tex.	Total chemicals capacity: 180 million lbs./year	Formerly Hildago Chemical Corp. Plant undergoing rehabilitation. Parent, Standard Oil Co. of Indiana.
Celanese Corp. of America	Bishop, Tex. Pampa, Tex.		Building new trimethylolpropane plant at Bishop, Tex. for completion late 1957.
Union Carbide Chemicals Co., division of Union Carbide	Texas City, Tex. Institute, W. Va. South Charleston, W. Va.		
Warren Petroleum Corp.	Conroe, Tex.	57 tons/year	Total plant investment: $3 million. Parent, Gulf Oil

Acetic acid

Company	Plant location	Capacity	Remarks
Amoco Chemicals Corp.	Brownsville, Tex.	Total chemicals capacity: 180 million lbs./year	
Celanese Corp. of America	Bishop, Tex. Pampa, Tex.		
Union Carbide Chemicals Co., division of Union Carbide	Whiting, Ind. Texas City, Tex. Institute, W. Va.		
Canadian Chemical Co., Ltd.	Edmonton, Alta.		Total plant investment: $80 million. Owned by Canadian Chemical and Cellulose Corp. of America.

Acetone

Company	Plant location	Capacity	Remarks
Allied Chemical & Dye Corp., Barrett Division	Frankford, Pa.		
Amoco Chemicals Corp.	Brownsville, Tex.	Total chemicals capacity: 180 million lbs./year	
Celanese Corp. of America	Bishop, Tex.		
Esso Standard Oil Co.	Linden, N.J.		
Hercules Powder Co.	Gibbstown, N. J.	16 million lbs./year	
Standard Oil Co. of California	Richmond, Calif.	20 million lbs./year	
Union Carbide Chemicals Co., division of Union Carbide	Whiting, Ind. Institute, W. Va.		
B.A. Shawinigan Ltd.	Montreal East, Que.	8 million lbs./year	Total plant investment: $4 million. Plant expansion completed this year to increase capacity 50%.
Shell Oil of Canada	Montreal, Que.	Total alcohol and acetone: 85 million lbs./year	

Acetylene

Company	Plant location	Capacity	Remarks
American Cyanamid Co.	Fortier, La.		Total plant investment: $50 million.
Diamond Alkali Co., Chlorinated Products Division	Deer Park (Houston), Tex.		Planning a multi-million-dollar acetylene-from-natural gas unit with construction to start probably early '58.
Monsanto Chemical Co.	Texas City, Tex.		Addition Onstream in '58
Rohm & Haas Co.	Pasadena, Tex.		Company plans a $10-million unit to make acetylene from natural gas with capacity of about 20 million lbs./year.
Union Carbide Chemicals Co., division of Union Carbide	Texas City, Tex.		

Acrylonitrile

Company	Plant location	Capacity	Remarks
American Cyanamid Co.	Fortier, La.		Company started $39-million program to double acrylonitrile capacity in April '56. Completion expected late '57.
Dow Chemical Co.	Freeport, Tex.		Construction to start early '58
Monsanto Chemical Co.	Texas City, Tex.		
Union Carbide Chemicals Co., division of Union Carbide	Institute, W. Va.		Doubling acrylonitrile capacity by mid-'58.

Ammonia

Company	Plant location	Capacity	Remarks
Allied Chemical & Dye Corp. Nitrogen Division	La Platte, Neb. South Point, O. Hopewell, Va.	75,000 tons/year 320,000 tons/year 400,000 tons/year	
American Cyanamid Co.	Fortier, La.		
Apache Powder Co.	Curtiss, Ariz.	30 tons/day	Girdler & Co. designed, engineered and will start up the $1-million, 30-tons/day ammonia plant by late '57.
Atlantic Refining Co.	Philadelphia, Pa.	100 tons/day	Company will increase ammonia capacity to 165 tons/day, part of an $11-million expansion program.
Atlas Powder Co.	(undecided)		$6-8-million ammonia plant is in the planning stage. Certificate of necessity has expired and no request for renewal is pending.
California Spray Chemicals Corp.	Richmond, Calif.	300 tons/day	
Calumet Nitrogen Products Co.	Hammond, Ind.	109,500 tons/year	Total plant investment: $9 million. Company is jointly owned (55% Indiana Standard-45% Sinclair).
Collier Carbon & Chemical Corp.	Brea, Calif.	86,000 tons/year	Total plant investment: $18 million. Formerly Brea Chemicals. Merged with R. T. Collier Corp. by parent Union Oil Co. of California.
Columbia River Chemicals Inc.	Attalia, Wash.	57,600 tons/year	Total plant investment: $12 million. Reported still in the planning stage.
Columbia-Southern Chemical Corp.	Natrium, W. Va.		Parent, Pittsburgh Plate Glass Co.
Commercial Solvents Corp.	Sterlington, La.	135,000 tons/year	Total plant investment: $45 million.
Cooperative Farm Chemicals Assn.	Lawrence, Kan.	13,200 tons/year	Total plant investment: $18 million.
Deere & Co., Grand River Chemical Division	Pryor, Okla.	65,800 tons/year	Total plant investment: $18 million.
Escambia Chemical Corp.	Pensacola, Fla.	72,000 tons/year	Total plant investment: $30 million.
Grace Chemical Co., division W. R. Grace & Co.	Woodstock, Tenn.	100,000 tons/year	Total plant investment: $20 million.
Hercules Powder Co.	Hercules, Calif. Louisiana, Mo.	50,000 tons/year 40,000 tons/year	
Mississippi Chemical Corp.	Yazoo City, Miss.	95,000 tons/year	Total plant investment: $18 million.

Company	Plant location	Capacity	Remarks
Mississippi River Chemical Co., division of Mississippi Fuel	Selma, Mo.	72,000 tons/year	Total plant investment: $15 million.
Monsanto Chemical Co., Lion Oil Co. division	El Dorado, Ark. Luling, La.		Total plant investment: $40 million at El Dorado site; $31 million at Luling.
Northern Chemical Industries, Inc.	Searsport, Me.	45,000 tons/year	Total plant investment: $14 million.
Olin Mathieson Chemical Corp.	Lake Charles, La.	95,000 tons/year	
Petroleum Chemicals Inc.	Lake Charles, La.	100,000 tons/year	Completion fall '57.
Phillips Chemical Co.	Etter, Tex. Pasadena, Tex.	191,600 tons/year 191,600 tons/year	Subsidiary of Phillips Petroleum Co.
Phillips Pacific Chemical Co.	Kennewick, Wash.	73,000 short tons/year	Jointly owned by Phillips Petroleum Co. and Pacific Pipeline Corp. Operated by Phillips Chemical Co.
St. Paul Ammonia Products Inc.	Pine Bend, Minn.	70,000 tons/year	Total plant investment: $15 million. Plant output will be sold to Central Farmers Fertilizer Co.
San Jacinto Chemical Co.	Houston, Tex.	43,200 tons/year	Total plant investment: $3 million. Parent, Smith Douglas Co., Inc.
Shell Chemical Co.	Pittsburg, Calif. Ventura, Calif.	65,000 tons/year	
Sohio Petroleum Co.	Lima, O.	300 tons/day	Total plant investment: $18 million. Subsidiary of Standard Oil Co. of Ohio.
Southern Nitrogen Co., Inc.	Savannah, Ga.	90,000 tons/year	Total plant investment: $14 million. Plant will use natural gas supplied by Southern Natural Gas Co. of Birmingham, Ala.
Spencer Chemical Co.	Calumet City, Ill. Pittsburg, Kan. Henderson, Ky. Vicksburg, Miss.	178,000 tons/year 79,000 tons/year 70,000 tons/year	
Standard Oil Co. of California	Richmond, Calif.	100,000 tons/year	
Sun Oil Co.	Marcus Hook, Pa.	109,500 tons/year	
The Texas Co.	Lockport, Ill.	180 tons/day	Under construction. Completion scheduled Nov. '57.
Thunderbird Chemicals Inc.	Kyrene, Ariz.		Total plant investment: $10 million. In planning stage.
U.S. Industrial Chemicals Co., division of National Distillers and Chemical Corp.	Tuscola, Ill.	45,000 tons/year	Total plant investment: $12 million.
Utah Chemical Co.	Mt. Pleasant, Utah	54,000 tons/year	Total plant investment: $9 million. Still in planning stages.
Canadian Hydrocarbons, Ltd.	Winnipeg, Man.	29,200 tons/year	Total plant investment: $1.5 million. Parent, Winnipeg & Central Gas Co. Plant in planning stage, according to latest available information.
Canadian Industries, Ltd.	Millhaven, Ont.	67,000 tons/year	Total plant investment: $9 million.
Consolidated Mining and Smelting Co. of Canada, Ltd.	Calgary, Alta.		
Dow Chemical of Canada, Ltd.	Sarnia, Ont.		
Quebec Ammonia Co., Ltd.	Maitland, Ont.	43,800 tons/year	Total plant investment: $8.5 million. Plant will ultimately operate on natural gas when it becomes available. In planning stage.
Sherritt Gordon Mines, Ltd., Chemical Metallurgical Division	Fort Saskatchewan, Alta.	1,000 tons/year	Ammonia is used as treating agent in nickel refining process. Total plant investment: $25 million.

Benzene

Company	Plant location	Capacity	Remarks
American Oil Co.	Texas City, Tex.		Parent, Standard Oil Co. of Indiana. Amoco Chemical Corp. is sales organization.
Atlas Processing Co.	Shreveport, La.	602 bbls./day	Total plant investment: $6 million. Plans isomerization unit. Construction to begin Sept. '57. Tentative completion date, March '58.
Chemoil Corp.	New Orleans, La.		Completion of refinery due Dec. '59.
Continental Oil Co.	Lake Charles, La. Baltimore, Md. Ponca City, Okla.	Benzene and other aromatic mixtures (as reformate) 3,850 bbls./day	Total plant investment: $2.7 million. Dodecane and benzene are delivered to the Continental petrochemical plant at Baltimore, Md., where dodecylbenzene is produced for the detergent industry. At Ponca City site: approximate investment, $7.5 million.
Cosden Petroleum Corp.	Big Spring, Tex.	2.5 million gal./year	Total plant investment: $9 million. 40-million-lbs./year dodecylbenzene plant is planned.
Delhi Taylor Oil Corp.	Corpus Christi, Tex.	1,050 bbls./day	
Eastern States Chemical Corp.	Houston, Tex.	75,000 bbls./year	Total plant investment: $3 million. Parent, Eastern States Petroleum Co., Inc.
Esso Standard Oil Co.	Baton Rouge, La.		
Frontier Oil Refining Co., division Ashland Oil & Refining Co.	Tonawanda, N.Y.	4.5 million gal./year	Total plant investment: $3.3 million. Startup scheduled for early '58.
Great Southern Chemical Corp.	Corpus Christi, Tex.	7.25 million gal./year	
Gulf Oil Corp.	Port Arthur, Tex.	30 million gals./year.	Onstream late '58
Humble Oil & Refining Co.	Baytown, Tex.	30 million gal./year	Onstream late '57.
Leonard Refineries Inc., Roosevelt Refinery Division	Mt. Pleasant, Mich.	5.5 million gal./year (benzene and toluene)	Total plant investment: $2 million.
Shell Oil Co.	Wilmington, Calif. Houston, Tex.	6.0 million gal./year 19.0 million gal./year	
Standard Oil Co. of California	El Segundo, Calif.		
Standard Oil Co. of Indiana	Whiting, Ind.	260,000 bbls./year	Amoco Chemical Corp. is sales organization.
Suntide Refining Co.	Corpus Christi, Tex.	145,000 bbls./year	Total plant investment: $10.5 million.
Sun Oil Co.	Marcus Hook, Pa.	19 million gal./year	
Velsicol Chemical Corp.	Marshall, Ill.		
Canadian Oil Refineries, Ltd.	Corunna, Ont.		Total plant investment: $30 million.

Company	Plant location	Capacity	Remarks
S. Nord Chemical Co.	Petrolia, Ont.	30 million gal./year (total B-T-X)	Total plant investment: $1 5 million.
Butadiene			
Allied Chemical & Dye Corp., Semet-Solvay Division	Tonawanda, N.Y.	8.0 million lbs./year	
Copolymer Rubber & Chemical Corp.	Baton Rouge, La.	35,000 short tons/year	Total plant investment: $10 million. GRS rubber capacity increased from 49,000 to 68,800 tons/year in July '57.
Dow Chemical	Midland, Mich.		
Dow Chemical Co., Texas Division	Freeport, Tex. Velasco, Tex.		
Esso Standard Oil Co.	Baton Rouge, La.		
Firestone Tire & Rubber Co., Synthetic Rubber and Latex Division	Orange, Tex.	40,000 short tons/year	
Humble Oil & Refining Co.	Baytown, Tex.	65,000 tons/year	Total plant investment: $48 million.
Neches Butane Products Co.	Port Neches, Tex.	200,000 short tons/year	Total plant investment: $53 million. Owned 50-50 by Texas-U.S. Chemical Co. and Goodrich Gulf Chemical Co. Expansion of butadiene plant from 2 to 3,000 short tons/year to be completed by fall '57.
Odessa Butadiene Co.	Odessa, Tex.	50,000 tons/year	Parents, El Paso Natural Gas Products Co., majority owner and operator. Butadiene onstream about Aug. '57 and styrene plant onstream early '58. Total cost of both plants: $27 million.
Petroleum Chemicals Inc.	Lake Charles, La.	80,000 tons/year	Total plant investment: $22.5 million.
Petro-Tex Chemical Corp.	Houston, Tex.	200,000 tons/year	Petro-Tex is 50-50 owned by Tennessee Gas Transmission Co. and Food Machinery and Chemical Corp. Two Houdry n-butane dehydrogenation units completed April '57 are producing additional 110,000 short tons/year of butadiene.
Phillips Chemical Co.	Borger, Tex.	110,000 short tons/year	Subsidiary of Phillips Petroleum Co.
Shell Chemical Co.	Torrance, Calif.	70,000 short tons/year	Total plant investment: $30 million. Cost and capacities are those reported at time of purchase of this plant from government in spring of '55.
Standard Oil Co. of California	El Segundo, Calif.		
Texas Butadiene & Chemical Corp.	Channelview, Tex.	86,000 tons/year	Total plant investment: $25 million.
Union Carbide Chemicals Co.	Seadrift, Tex. Texas City, Tex. South Charleston, W. Va.		Parent, Union Carbide Corp.
Imperial Oil Ltd.	Sarnia, Ont.		Total plant investment: $5 million.
Polymer Corp. Ltd.	Western Canada (Deer Park Area)		Company is considering new butadiene facilities, depending on the supply of butane that may become available as a result of Trans-Canada pipeline.

Company	Plant location	Capacity	Remarks
Butylenes			
Atlantic Refining Co.	Philadelphia, Pa.		
Gulf Oil Corp.	Port Arthur, Tex.		
Humble Oil & Refining Co.	Baytown, Tex.		
Petro-Tex Chemical Corp.	Houston, Tex.		
Pure Oil Co.	Nederland, Tex.		
Shell Oil Co.	Martinez, Calif. Wilmington, Calif.		
Sun Oil Co.	Toledo, O.		
Texas Butadiene & Chemical Corp.	Channelview, Tex.		Plant completed Feb. '57. Can operate for 86,000 tons/year butadiene or, when producing butylenes, for 2.5 million bbls./year of aviation-grade alkylate; butadiene production will be 65,000 tons/year.
The Texas Co.	Port Arthur, Tex.		
Canadian Oil Refineries, Ltd.	Corunna, Ont.		Total plant investment: $30 million.
Imperial Oil Ltd.	Sarnia, Ont.		Total plant investment: $5 million.
Sun Oil Co., Ltd.	Sarnia, Ont.		
Cresols			
Atlantic Refining Co.	Philadelphia, Pa.		
Leonard Refineries Inc.	Alma, Mich.		
Magnolia Petroleum Co.	Beaumont, Tex.		Parent, Socony Mobil Oil Co., Inc.
Merichem Co., Division of Jefferson Lake Sulphur Co.	Houston, Tex.		Company has a $1-million expansion program under way.
Pitt-Consol Chemicals Co.	Newark, N. J.		Total plant investment: $3 5 milion.
Productol Co.	Santa Fe Springs, Calif.		
Shell Oil Co.	Wilmington, Calif.		
Sinclair Refining Co.	East Chicago, Ind. Marcus Hook, Pa. Houston, Tex.		Sales affiliate, Sinclair Chemicals Inc., a subsidiary of Sinclair Oil Corp.
Standard Oil Co. of California	Richmond Calif.		
Cumene			
Hercules Powder Co.	Gibbstown, N. J.		Products include cumene and cumene hydroperoxide. Company has pilot-scale manufacture of dicumyl peroxide, a cumene derivative.
Standard Oil Co. of California	El Segundo, Calif.		
British American Oil Co., Ltd.	Montreal, Que.	36 million lbs./year	Cumene is raw material for B. A. Shawinigan, Ltd.
Ethanol			
Amoco Chemicals Corp.	Brownsville, Tex.	Total chemicals: 180 million lbs./year	
Esso Standard Oil Co.	Baton Rouge, La.		
National-Petro Chemicals Co.	Tuscola, Ill.	40 million gal./year	Parent companies, National Distillers & Chemical Co. (60%) and Pan Handle Eastern Pipe Line Co. (40%).

Company	Plant location	Capacity	Remarks
Texas Eastman Co., Division of Eastman Kodak Co.	Longview, Tex.		
Union Carbide Chemicals Co., Division of Union Carbide Corp.	Whiting, Ind. Texas City, Tex. Institute, W.Va.		
Ethylbenzene			
Cosden Petroleum Corp.	Big Spring, Tex.	22 million lbs./year	Total plant investment: $9 million.
Dow Chemical Co.	Midland, Mich.		
Koppers Co. Inc., Chemical Division	Port Arthur, Tex. (Williams Plant)	120 million lbs./year	Total plant investment: $9 million.
Monsanto Chemical Co.	Texas City, Tex.		
Ethylene			
Celanese Corp. of America, Plastics Division	Houston, Tex.		Total plant investment: $10 million. Low-pressure polyethylene operations started April '57.
Chemoil Corp.	New Orleans, La.		Completion of refinery due Dec. '59.
Crown Central Petroleum Corp.	Houston, Tex.		
Dow Chemical Co.	Baton Rouge, La.		Completion of $50-million plant scheduled in '58.
Esso Standard Oil Co.	Linden, N. J.		New ethylene unit scheduled for completion this year.
Gulf Oil Corp.	Port Arthur, Tex.	400 million lbs./year	
Jefferson Chemical Co.	Port Neches, Tex.		Plans $38-million expansion in chlorine, caustic soda, ethylene, ethylene oxide and ethylene glycol.
Phillips Chemical Co.	Sweeny, Tex.	180 million lbs./year	Subsidiary of Phillips Petroleum.
Richfield Oil Corp. Watson Refinery	Los Angeles County, Calif.	25 million lbs./year	
The Texas Co.	Port Arthur, Tex.		
Canadian Oil Refineries, Ltd.	Corunna, Ont.		Total plant investment: $30 million.
Carbide Chemicals Co., division of Union Carbide Canada Ltd.	Montreal East, Que.		
Dow Chemical of Canada, Ltd.	Sarnia, Ont.		Increasing ethylene capacity, with completion scheduled for fall '57.
Imperial Oil Ltd.	Sarnia, Ont.		Total plant investment: $5 million.
Polymer Corp., Ltd.	Sarnia, Ont.		Total plant investment: $83 million.
Monsanto Chemicals Co.,	Texas City, Tex.		150% ethylene expansion program completed early '57. N-butane, ethylene plant being built for captive use.
Union Carbide Chemical Co., division of Union Carbide Corp.	Seadrift, Tex.		Increased ethylene capacity to 200 million lbs./year in fall '56.
Ethylene oxide			
Allied Chemical & Dye Corp., Nitrogen Division	Orange, Tex.	12,000 tons/year	
Calcasieu Chemical Corp.	Lake Charles, La.		To be engineered and operated by Petroleum Chemicals, Inc. Lummus Co. will build the $11-million unit using Shell Development Co.'s ethylene oxide process.
Dow Chemical Co.	Midland, Mich. Freeport, Tex. Velasco, Tex.		At Freeport and Velasco site, additional ethylene glycol facilities are under construction.
General Aniline & Film Corp.	Linden, N. J.	60 million lbs./year	Esso Standard Oil Co. will supply ethylene. Completion late 57.
Jefferson Chemical Co.	Port Neches, Tex.		Parents, American Cyanamid Co. and The Texas Co. Plans $38-million expansion of chlorine, caustic, ethylene, ethylene oxide and ethylene glycol facilities.
Olin Mathieson Chemical Corp.	Brandenburg, Ky.		
Union Carbide Chemicals Co., division of Union Carbide Corp.	Torrance, Calif. Whiting, Ind. Texas City, Tex. Seadrift, Tex. Institute, W.Va.		At Seadrift, increased ethylene capacity to 200 million lbs./year in fall '56.
Wyandotte Chemicals Corp.	Geismar, La.	60 million lbs./year	Total plant investment: $8 million. Completion due late '57.
Carbide Chemicals Co., Division Union Carbide Canada Ltd.	Montreal East, Que.		$4-million expansion under way to double original capacity for ethylene glycol and polyethylene.
Dow Chemical of Canada, Ltd.	Sarnia, Ont.		Increasing ethylene capacity, with completion scheduled for '57.
Formaldehyde			
Allied Chemical & Dye Corp., Nitrogen Division	South Point, O.	42,500 tons/year (100%)	
The Borden Co., Chemical Division	Fayetteville, N. C. Kent, Wash.	36 million lbs./year 36 million lbs./year	
Celanese Corp. of America	Bishop, Tex.		
Hercules Powder Co.	Louisiana, Mo.	100 million lbs./year	Total plant investment: $5 million. New formaldehyde and pentaerythritol units costing $6 million, now in production.
Reichhold Chemicals, Inc.	Tuscaloosa, Ala.	30 million lbs./year	Total plant investment: $3 million. Pentaerythritol production to be doubled and phenol increased 50% to 75 million lbs./year. Also will build a new 35 million-lbs.-a-year formaldehyde unit.
	Ballardvale, Mass. Charlotte, N.C. Seattle, Wash. Tacoma, Wash.		
Spencer Chemical Co.	Calumet City, Ill.		$120,000 expansion of formaldehyde capacity completed Jan. '57.
Warren Petroleum Corp.	Conroe, Tex.	1,100 tons/year	Total plant investment: $3 million.
Bakelite Co., division of Union Carbide Canada Ltd.	Belleville, Ont.		
St. Maurice Chemicals Co.	Varennes, Que.	30 million lbs./year	Parents, Shawinigan Chemicals Co. and Heyden Newport Chemical Corp.

Glycerine

Company	Plant location	Capacity	Remarks
Dow Chemical Co., Texas Division	Freeport, Tex. Velasco, Tex.		Second glycerine plant under construction to double present capacity by March '58.
Shell Chemical Corp.	Norco, La. Houston, Tex.	30 million lbs./year	Acrolein and glycerine units planned.

Methanol

Company	Plant location	Capacity	Remarks
Allied Chemical & Dye Corp., Nitrogen Division	South Point, O.	53,500 tons/year	
Amoco Chemicals Corp.	Brownsville, Tex.	Total chemicals: 180 million lbs./year	Formerly Hildago Chemical Corp. Plant undergoing rehabilitation. Parent, Standard Oil Co. of Indiana.
Celanese Corp. of America	Bishop, Tex. Pampa, Tex.		
Commercial Solvents Corp.	Sterlington, La.		Total plant investment: $45 million. A $10-million program to increase production of methanol and petrochemicals will be completed this year.
E. I. du Pont de Nemours & Co., Inc.	Orange, Tex.		
Escambia Chemical Corp.	Pensacola, Fla.		20-million-gal./year plant planned for '58. Total plant investment: $30 million.
Hercules Powder Co.	Louisiana, Mo.	7 million gal./year	Total plant investment: $5 million. A $2-million methanol unit under construction as part of pentaerythritol production.
Monsanto Chemical Co.	Texas City, Tex.	25 million gal./year	Plant investment: $15.3 million for methanol and vinyl chloride only. Methanol unit operated by Monsanto and Heyden Newport Chemical Co.
Rohm & Haas Co.	Pasadena (Deer Park), Tex.		Planning a 100-tons/day methanol plant.
Spencer Chemical Co.	Pittsburg, Kan.		Total plant investment: $11 million.
Union Carbide Chemicals Co., division of Union Carbide Corp.	Texas City, Tex. South Charleston, W. Va.		

Nitric acid

Company	Plant location	Capacity	Remarks
California Spray Chemicals Corp.	Richmond, Calif.	250 tons/day	Parent, Standard Oil Co. of California.
Collier Carbon & Chemical Corp.	Brea, Calif.	44,000 tons/year	Original plant investment: $18 million. Formerly Brea Chemicals Inc. Merged with R. T. Collier Corp. by parent, Union Oil Co. of California.
Escambia Chemical Corp.	Pensacola, Fla.	80,000 tons/year	Total plant investment: $30 million.
Mississippi Chemical Corp.	Yazoo City, Miss.	114,000 tons/year	Total plant investment: $18 million.
Mississippi River Chemical Co., division of Mississippi River Fuel Corp.	Selma, Mo.	79,200 tons/year	Total plant investment: $15 million
Monsanto Chemical Co., Lion Oil Division	El Dorado, Ark. Luling, La.		Total plant investment: $40 million. Total plant investment: $31 million.
Northern Chemical Industries, Inc.	Searsport, Me.	21,600 tons/year	Total plant investment: $14 million
Olin Mathieson Chemical Corp.	Lake Charles, La.		
Phillips Chemical Co.	[illegible]	130,000 tons/year	Subsidiary of Phillips Petroleum Co.
Sohio Petroleum Co.	Lima, O.		Total plant investment: $18 million. Subsidiary of Standard Oil Co. of Ohio.
Southern Nitrogen Co., Inc.	Savannah, Ga.		Total plant investment: $14 million. Plant scheduled for completion this year.
Spencer Chemical Co.	Pittsburg, Kan.		Total plant investment: $11 million.
	Henderson, Ky.		Total plant investment: $3 million.
	Vicksburg, Miss.	36,500 tons/year	Total plant investment: $14 million.
Standard Oil Co. of California	Richmond, Calif.	90,000 tons/year	
The Texas Co.	Lockport, Ill.		Under construction. Completion scheduled Nov. '57

Pentaerythritol

Company	Plant location	Capacity	Remarks
Hercules Powder Co.	Louisiana, Mo.	24 million lbs./year	Total plant investment: $5 million. New formaldehyde and pentaerythritol units costing $6 million now in production; $2-million methanol unit under construction as part of pentaerythritol production.
Heyden Newport Chemical Corp.	Heyden Fords, N. J.	25 million lbs./year	Total plant investment: $4 million. Under construction; completion scheduled this year. Formerly Heyden Chemical Corp. plant.
Reichhold Chemicals Co.	Tuscaloosa, Ala.	5 million lbs./year	Total plant investment: $3 million. Pentaerythritol production to be doubled and phenol increased 50% to 75 million lbs./year. Also will build a new 35-million-lbs./year formaldehyde unit.
Warren Petroleum Corp.	Conroe, Tex.	1,800 tons/year	Total plant investment: $3 million.
Canadian Chemical Co., Ltd.	Edmonton, Alta.		
St. Maurice Chemicals Co.	Varennes, Que.	3 million lbs./year	Parents, Shawinigan Chemicals Co. and Heyden Newport Chemical Corp.

Phenol

Company	Plant location	Capacity	Remarks
Allied Chemical & Dye Corp., Barrett Div.	Frankford, Pa.	30 million lbs./year	
Hercules Powder Co.	Gibbstown, N. J.	26 million lbs./year	
The Merichem Co., division of Jefferson Lake Sulphur Co.	Houston, Tex.		$1-million expansion under construction.
Monsanto Chemical Co.	Avon, Calif.	20 million lbs./year	Total plant investment: $5 million.
Pitt-Consol Chemicals Co.	Newark, N. J.		Total plant investment: $3.5 million. Formerly Reilly Tar & Chemical Co.
Productol Co.	Sante Fe Springs, Calif.		
Reichhold Chemicals, Inc.	Tuscaloosa, Ala.	50 million lbs./year	Total plant investment: $3 million. Phenol production to be increased 50%.
Shell Chemical Corp.	Martinez, Calif.		
Standard Oil Co. of California	Richmond, Calif.	35 million lbs./year	

Company	Plant location	Capacity	Remarks
B. A. Shawinigan Ltd.	Montreal East, Que.	20 million lbs./year	Total plant investment: $4 million. Plant expansion to increase capacity 50% completed this year.
Phthalic anhydride			
Amoco Chemicals Corp.	Joliet, Ill.	Total chemicals: 60 million lbs./year	Total plant investment: $10 million. Completion '58.
Mobay Chemical Co.	New Martinsville, W.Va.		Total plant investment: $10 million.
Reichhold Chemicals, Inc.	Azusa, Calif.	10 million lbs./year	Company plans $10-million expansion throughout all plants in phenol, pentaerythritol, phthalic anhydride, maleic anhydride, formaldehyde, glycerine.
	Detroit, Mich.	8 million lbs./year	
Standard Oil Co. of California	Richmond, Calif.		
Polyethylene			
Allied Chemical & Dye Corp., Semet-Solvay Division	Tonawanda, N. Y.	20 million lbs./year	Present polyethylene facilities represent a $10-million investment. Installing additional capacity for polyethylene resin pipe compound to be available this year.
Dow Chemical Co., Texas Division	Freeport, Tex. Velasco, Tex.		
E. I. du Pont de Nemours & Co., Inc.	Orange, Tex.	100 million lbs./year	Increasing capacity of polyethylene and modernizing adipic acid facilities.
W. R. Grace & Co.	Baton Rouge, La.	50 million lbs./year	Total plant investment: $18 million. Fluor Corp. has construction contract for Phillips Petroleum licensed process. Completion scheduled for '57.
Hercules Powder Co.	Parlin, N. J.	30 million lbs./year	Total plant investment: $10 million. Uses Ziegler process license. In operation, July '57.
Koppers Co., Inc.	Woodbridge, N. J.	30 million lbs./year	Completion of plant by Sept. '57. Ethylene from Esso's unit at Linden.
	Port Arthur, Tex.	18 million lbs./year	Total plant investment: $19 million.
Monsanto Chemical Co.	Texas City, Tex.	66 million lbs./year	150% ethylene expansion program completed early '57.
National Petro-Chemical Co.	Tuscola, Ill.	50 million lbs./year	Total plant investment: $70 million. Ethylene capacity increased to 450 tons/day and polyethylene (both high- and low-density) to 100,000 lbs./year onstream March '57.
Phillips Chemical Co.	Pasadena, Tex.	50-75 million lbs./year	Capacity facilities to be completed this year.
Spencer Chemical Co.	Orange, Tex.	45 million lbs./year	Total plant investment: $12 million. Plans to double capacities for conventional- and medium-density polyethylene by '58.
Tennessee Eastman Co.	Kingsport, Tenn.		
Texas Eastman Co., Division Eastman Kodak Co.	Longview, Tex.	55 million lbs./year	
Union Carbide Chemicals Co., division of Union Carbide Corp.	Torrance, Calif. Seadrift, Tex.	60 million lbs./year	Increased ethylene capacity to 200 million lbs./year in fall '56.
Texas City, Tex. Institute, W.Va. South Charleston, W.Va.		60 million lbs./year	
Canadian Industries, Ltd.	Edmonton, Alta.	22.6 million lbs./year	Total plant investment: $15 million. Doubling polyethylene capacity. Completion in '59.
Carbide Chemicals Co., division of Union Carbide Canada Ltd.	Montreal East, Que.		$4-million expansion under way to double ethylene glycol and polyethylene capacity.
Propylene			
Allied Chemical & Dye Corp., Semet-Solvay Division	Tonawanda, N. Y.	10 million lbs./year	
Chemoil Corp.	New Orleans, La.		Completion of refinery due Dec. '59.
Crown Central Petroleum Corp.	Houston (Pasadena), Tex.		Petrochemical products extracted by Shell Chemical Corp.
Dow Chemical Co.	Baton Rouge, La.		Completion of $50-million plant in '58.
Esso Standard Oil Co.	Baton Rouge, La.		
Gulf Oil Corp.	Philadelphia, Pa. Port Arthur, Tex.		
Humble Oil & Refining Co.	Baytown, Tex.		Total plant investment: $48 million.
Socony Mobil Oil Co. Inc.	Paulsboro, N. J.		
The Texas Co.	Port Arthur, Tex.		
Imperial Oil Ltd.	Sarnia, Ont.		Total plant investment: $5 million.
Propylene trimer and tetramer			
American Oil Co.	El Dorado, Ark.	3.8 million gal./year (tetramer) 350,000 gal./year (trimer)	Formerly Pan-Am Southern Corp. Parent, Standard Oil Co. of Indiana. Amoco Chemicals Corp. is sales organization.
Continental Oil Co.	Ponca City, Okla.		Total plant investment: $7.5 million.
D-X Sunray Oil Co.	Duncan, Okla.	160,000 bbls./year (tetramer)	Total plant investment: $500,000.
Esso Standard Oil Co.	Baton Rouge, La.		
Gulf Oil Corp.	Port Arthur, Tex.		
Humble Oil & Refining Co.	Baytown, Tex.		Total plant investment: $48 million
Republic Oil Refining Co.	Texas City, Tex.	16.5 million lbs./year (tetramer) 24.4 million lbs./year (trimer)	
Sun Oil Co.	Toledo, O. Marcus Hook, Pa.		
Suntide Refining Co.	Corpus Christi, Tex.	150,000 bbls./year (tetramer)	Total plant investment: $10.5 million. Tetramer and mineral spirits in current production.
The Texas Co.	Port Arthur, Tex.		
Imperial Oil Ltd.	Sarnia, Ont.		Total plant investment: $5 million.
Styrene			
Bakelite Co.	Marietta, O.		Raw materials from both petroleum and nonpetroleum sources.

Company	Plant location	Capacity	Remarks
Cosden Petroleum Corp.	Big Spring, Tex.	20 million lbs./year	20-million-lbs./year polystyrene capacity under construction; 40-million- lbs./year dodecylbenzene planned. New styrene recovery plant onstream Feb. '57.
Dow Chemical Co.	Midland, Mich.		
	Freeport, Tex. Velasco, Tex.		Additional styrene facilities under construction.
Koppers Co., Inc.	Monaca, Pa.	90,000 tons/year	
Monsanto Chemical Co.	Texas City, Tex.	140,000 tons/year	
Odessa Butadiene Co.	Odessa, Tex.	35 million lbs./year	Parent, El Paso Natural Gas Products Co., majority owner and operator. Styrene plant onstream early '58.
Pennsylvania Industrial Chemical Corp.	Clairton, Pa.		
Shell Chemical Co.	Torrance, Calif.		
Dow Chemical of Canada, Ltd.	Sarnia, Ont.		
Polymer Corp., Ltd.	Sarnia, Ont.		Total plant investment: $83 million; 120,000 tons of all types of rubber were produced in '56.

Toluene

American Oil Co.	Texas City, Tex.		Parent, Standard Oil Co. of Indiana.
Chemoil Corp.	New Orleans, La.		Completion of refinery due Dec. '59.
Continental Oil Co.	Ponca City, Okla.		Total plant investment: $7.5 million.
Cosden Petroleum Corp.	Big Spring, Tex.	7 million gal./year	
Delhi Taylor Oil Corp.	Corpus Christi, Tex.	700 bbls./day	
Dow Chemical Co., Texas Division	Freeport, Tex. Velasco, Tex.		
Frontier Oil Refining Co., division of Ashland Oil & Refining Co.	Tonawanda, N.Y.	12 million gal./year (including xylenes)	Startup scheduled for early '58.
Great Southern Chemical Corp.	Corpus Christi, Tex.	13 million gal./year	
Humble Oil & Refining Co.	Baytown, Tex.		Total plant investment: $48 million.
Leonard Refineries Inc., Roosevelt Refinery Division	Mt. Pleasant, Mich.	5.5 million gal./year (benzene and toluene), 500,000 gal./year (toluene-xylene conc.)	Total plant investment: $2 million.
Pennsylvania Industrial Chemical Corp.	Chester, Pa.		This is a small 100,000-gal./day plant.
Pure Oil Co.	Toledo, O.		Aromatic products all going into motor fuel at present.
Shell Oil Co.	Wilmington, Calif. Wood River, Ill. Houston, Tex.	33 million gal./year	
Sinclair Refining Co.	Marcus Hook, Pa.		Sales affiliate, Sinclair Chemicals.
Standard Oil Co. of California	Richmond, Calif.		
Standard Oil Co. of Indiana	Whiting, Ind.	450,000 bbls./year	Amoco Chemical Corp. is sales agent.
Sun Oil Co.	Marcus Hook, Pa.	30 million gal./year	
Suntide Refining Co.	Corpus Christi, Tex.	325,000 bbls./year	Total plant investment: $10.5 million.
Velsicol Chemical Corp.	Marshall, Ill.		
Canadian Oil Refineries, Ltd.	Corunna, Ont.		Total plant investment: $30 million. Second Platformer-Udex unit, with Udex capacity of 3,650 bbls./day to produce pure benzene-toluene-xylene chemicals, onstream this year.
S. Nord Chemical Co.	Petrolia, Ont.	30 million gal./year (benzene-toluene-xylene)	Total plant investment: $1.5 million.

Xylenes

American Oil Co.	Texas City, Tex.		Parent, Indiana Standard Oil Co.
Chemoil Corp.	New Orleans, La.		Completion of refinery due Dec. '59.
Cosden Petroleum Corp.	Big Spring, Tex.	9 million gal./year	Total plant investment: $9 million.
Frontier Oil Refining Co., division of Ashland Oil & Refining Co.	Tonawanda, N. Y.	12 million gal./year (xylene-toluene)	Total plant investment: $3.3 million. Startup scheduled for early '58.
Great Southern Chemical Corp.	Corpus Christi, Tex.	4.2 million gal./year	
Humble Oil & Refining Co.	Baytown, Tex.		Total plant investment: $48 million.
Pennsylvania Industrial Chemical Corp.	Chester, Pa.		This is a small 100,000-gal./day plant.
Pure Oil Co.	Toledo, O.		Aromatic products all going into motor fuel at present.
Shell Oil Co.	Wilmington, Calif. Wood River, Ill.		
Sinclair Refining Co.	Marcus Hook, Pa.		Sales affiliate, Sinclair Chemicals Inc., a subsidiary of Sinclair Oil Corp.
Standard Oil Co. of California	Richmond, Calif.	5 million lbs./year (*m*-xylene)	Building a *p*-xylene plant for April '58 completion. Feed will be whole xylenes to produce 27-million lbs./year *p*-xylene.
Standard Oil Co. of Indiana	Whiting, Ind.	220,000 bbls./year	Amoco Chemical Corp. is sales agent.
Sun Oil Co.	Marcus Hook, Pa.	18 million gal./year	
Suntide Refining Co.	Corpus Christi, Tex.	400,000 bbls./year	Total plant investment: $10.5 million.
Velsicol Chemical Corp.	Marshall, Ill.		
Canadian Oil Refineries, Inc.	Corunna, Ont.		
S. Nord Chemical Co.	Petrolia, Ont.	30 million gal./year (benzene-toluene-xylene)	Total plant investment: $1.5 million.

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Technology
Newsletter

CHEMICAL WEEK
September 28, 1957

A column for separating lithium-7 has reportedly been put in operation by the German firm Degussa, at Hanau (near Frankfurt). The firm starts with lithium chloride, produces lithium-7 of 99.974% purity.

This could be important for applications involving use of lithium as a coolant in nuclear aircraft reactors. For although lithium-7—which has a low neutron-absorption cross section of 1.0 Barns—makes up 94% of naturally occurring lithium, the other isomer—lithium-6—has a high neutron-absorption cross section (912 Barns). And a low neutron-absorption cross section is a must for a coolant.

The German process uses 8 kwh. of power to make 1 gram. That would mean a relatively high cost for electricity alone ($36/lb. at 1¢/kwh.). But that would be a drop in the bucket, compared with present costs of purified lithium isotopes as charged by the Atomic Energy Commission: 2-3¢/mg. ($9,000-14,000/lb.) for lithium-6 and 15-30¢/mg. ($68,000-136,000/lb.) for lithium-7. It should be remembered, however, that these prices don't reflect anything like commercial production.

Earlier published work by A. Klem in Germany has dealt with the concentration of lithium isotopes by electrolytic ion migration. And the University of Wisconsin (under a Navy contract) has done work on an electrolytic separation using molten lithium nitrate.

•

Watch for word soon about work on coating stainless steel and other alloys with molybdenum that has been done by Vitro Laboratories. The method employs electrophoretic deposition from nonaqueous media, uses the article to be coated as an electrode. It reportedly gives uniform adherent coats even on irregularly shaped objects.

Such a technique would probably be rather expensive, and wouldn't be suitable for mass production. But Vitro feels that for certain applications, it gives a rapid, economical deposition.

•

Grace's rare-earth plant has run into processing difficulties, and Grace is now trying to terminate its contract with Atomic Energy Commission to supply thorium oxide from the Baltimore plant.

When it was opened last year (*CW, July 14, '56, p. 68*), the $2-million plant was billed as the "largest and most modern of its type." It was rated to treat 12-15 tons/day of monazite. But Grace now reports it was unable to meet the schedule called for in its AEC contract.

•

Wool research in the U. S. will get a boost. A $405,000 chunk of the recently voted U. S. Dept. of Agriculture appropriation is earmarked for a new pilot plant to evaluate methods of improving wool processing. To be located at USDA's Western Utilization Research and Development

Division (Albany, Calif.), the pilot unit will be coordinated with the group's present lab research. Plans for the new pilot plant are now on the drawing boards; construction is expected to start within six to nine months.

One development sure to get study will be the USDA-developed polyamide-epoxy resin process for shrinkproofing wool *(CW, Aug. 31, p. 89)*. Also due for study: chemical modifications to increase wool's resistance to acid, alkali and yellowing on exposure to light.

•

Economics of the Zimmermann wet combustion process for sewage disposal *(CW, Nov. 5, '55, p. 78)* is being tested by Chicago sanitary engineers. Sterling Drug Inc. (New York) designed and constructed the sewage disposal pilot plant, is conducting the trial operation under a research contract with Metropolitan Sanitary District of Greater Chicago.

Wet combustion of sludge remaining after treatment of raw sewage takes place in a reactor under pressure of 1,000-1,500 psi., heated above 480 F. Oxygen, provided by continuous supply of compressed air, combines with combustible materials in the sludge until only water, carbon dioxide and a fine ash are left. Water is pumped to lagoons to permit the ash to settle, may then be drawn off to streams without danger of pollution.

A large Zimmermann process installation designed to recover heat (in the form of process steam) from waste pulp liquor is currently being built by Aktieselskapet Borregaard at Sarpsborg, Norway (*CW Technology Newsletter, Oct. 29, '55*).

•

Borax Consolidated in England will build a new lab at Surrey to research "all aspects" of boron chemistry, says the new building will enable the firm to go far beyond anything attempted in its present lab. Among other things, it will investigate organic chemistry of boron, reaction of boron compounds at high temperatures.

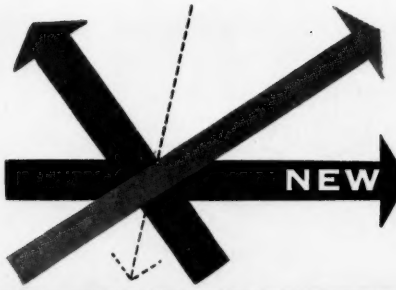
•

Eli Lilly has a new analgesic, Darvon, said to be equivalent to codeine in both duration and intensity of action. But it isn't classed as a narcotic, doesn't produce euphoria, tolerance or physical dependence when administered in clinically useful doses.

•

The organic-moderated reactor—one of the eight types of reactor systems being studied by AEC—went into operation last week at the commission's National Reactor Test Station in Idaho. Developed by Atomics International, the OMRE employs terphenyl as both moderator and coolant. At full power, the test reactor will produce about 16,000 kw. of heat.

Also started last week: the engineering test reactor, a $14-million light-water-moderated and -cooled system rated at 175,000 kw. (heat).



PRODUCT DIRECTIONS

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ATLANTIC
PETROLEUM
CHEMICALS

Bell Labs' Peters checks bond strength of polyethylene-rubber-brass sandwich.

Coming to Grips with Two Adhesive Posers

Two new adhesives are taking on formidable tasks this week. One is a partly hydrogenated polybutadiene that supplies a strong bond between polyethylene and brass or rubber. The other is a unique silicone that adheres to silicone rubbers, or to metals.

Bell Telephone Laboratories' (New York) Henry Peters developed the polyethylene bonding process that utilizes a mixture of the polybutadiene and vulcanizing agents. The former is Phillips Petroleum Co.'s Hydropol. Peters finds that a polybutadiene of between 3% and 30% unsaturation gives the best bonds—e.g., peel strengths up to 100 psi. and tensile strengths of 1,000 psi.

Bonding may be carried out at temperatures ranging from 250-350 F, pressures of 100 psi. or less. Peters is investigating application of the technique to polyethylene-related plastics.

He theorizes that the adhesive adheres to the polyethylene because of its similar structure and thermoplastic properties. Its bond to rubber (neoprene, natural rubber or GR-S) is probably due to the formation of sulfur crosslinks at the interface during vulcanizing.

Bell has immediate application for Peters' work. In its undersea telephone cables, the company has been using four intermediate layers of polyethylene and natural rubber for insulation. The new bonding technique will permit the use of one layer of each. And the insulation will still be strong enough to resist both water and pressure.

New Affinity: Like polyethylene, silicones are hard to bond with adhesives. But silicones and a new silicone polymer, out of Union Carbide's silicones division (Tonawanda, N.Y.), have a mutual affinity. The new, "sticky" silicone was developed by researcher Frank Fekete and James Lorenz, assistant product manager, silicone rubbers. It is a polysiloxane containing vinyl groups (Carbide won't say more), can be supplied as a rubber or in solution. Another version, containing carbon black, conducts electricity, is still under development.

Carbide calls its new polymer a "fusible silicone," thinks it will be typically useful as a pressure-sensitive tape in insulating cable. The material has been designated K-1605R (R standing for red). It's available catalyzed with 2,4-dichlorobenzoyl peroxide or uncatalyzed. Price: around $4/lb. in 1-99-lb. lots. Carbide tells fabricators that the new silicone is

easily processed by molding, extruding, calendering or solution-coating. In solution (toluene), it's offered as K-1605 RS, 25% silicone solids.

The new compounds are the latest results of systematic investigations *(CW, Sept. 17, '55, p. 61)* that are making the development of new adhesives less a matter of chance discovery than has heretofore been the case. Under the impact of this research, some of the toughest adhesive problems should eventually yield.

Creativity Confab

The researcher as an individual drew sharp scrutiny at the recent Eleventh National Conference on the Administration of Research in Washington, D.C. Nearly 200 conferees came away with fresh slants on such perennially challenging subjects as motivation and creativity.

Raymond Hainer, senior physical chemist at Arthur D. Little (Cambridge, Mass.), defined motivation as "not a rational, learned or easily discussed subject; rather, it involves intuition, personal feeling and private, not shared, knowledge."

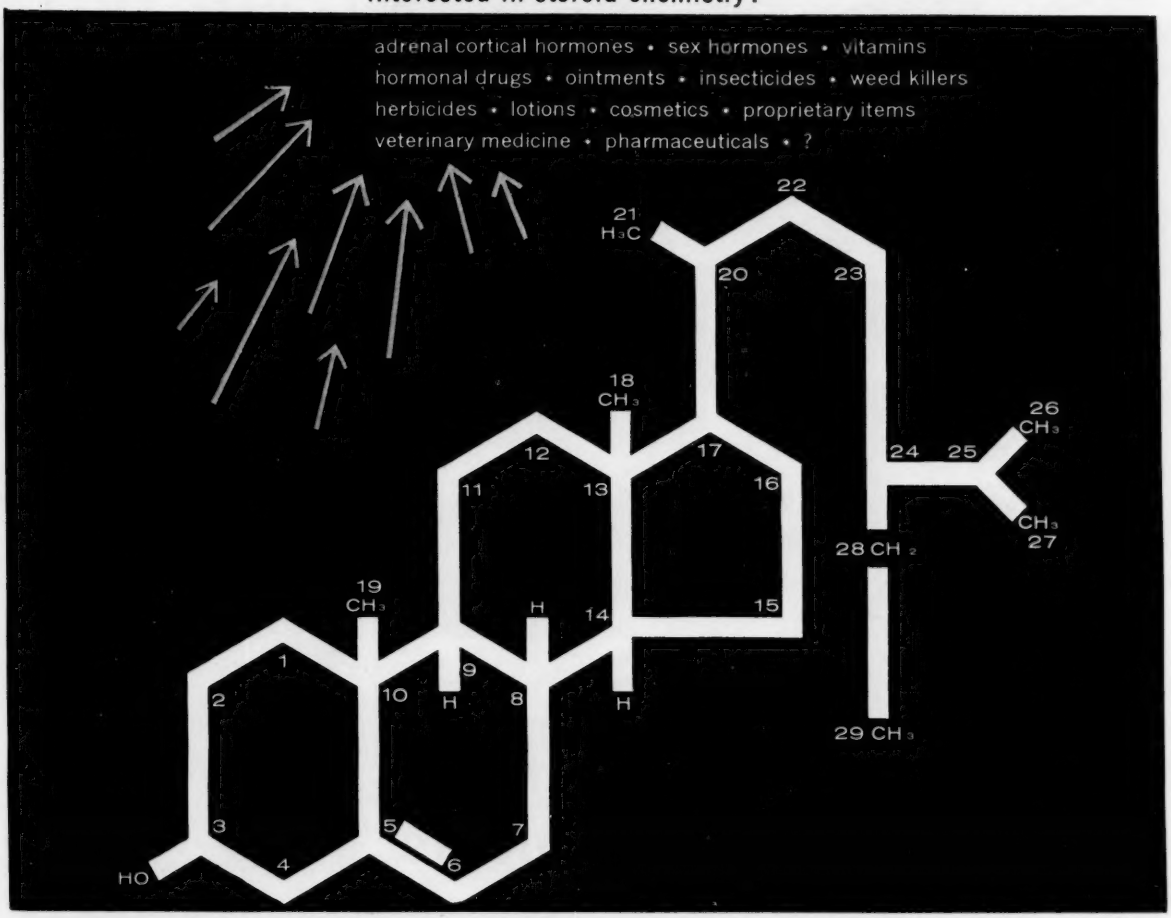
But Hainer did volunteer his conception of a common method of motivating research: "Choose the best possible man at hand, give him the only people available, name the problem that someone else has failed to solve, and designate an impossible deadline."

There are advantages, he believes, in driving researchers while offering them material inducements (e.g., "a country club environment"). This technique, Hainer says, works best when the individuals are more "run-of-the-mill" and are not generally creative, and when the problems they are to work on are under close supervision.

But group motivation, in his opinion, requires a lot more than rewards for productivity. It calls for psychological insight into the complexities of both individuals and groups.

Respect for the individual is pretty important, too, in stimulating creativity, according to Bell Labs' researcher W. D. Lewis. Says Lewis, "Because its product, by definition, is novel, a research department, unlike most other parts of a business organization, cannot afford to standardize

interested in steroid chemistry?



The molecular structure of sitosterol is much like that of cholesterol. It has a saturated phenanthrene ring system with completely saturated side chains attached to the ring nucleus. Main differences are in lateral chains and in the number of CH_3 groups possessed by each.

who knows what men with ideas will do with General Mills **sitosterol?**

Creative chemists are now exploring its potential! Availability and relatively low cost make General Mills sitosterol extremely interesting to present users of cholesterol. As a chemical building block, the white, crystalline fatty alcohol can be used as a starting point for synthesis into many new products. Because the hydrophobic fraction of the molecule dominates, sitosterol can be used as an emulsifier or stabilizer for water-oil emulsions. It is suitable as a vehicle for therapeutic agents . . . holds promise of opening new opportunities in many fields.

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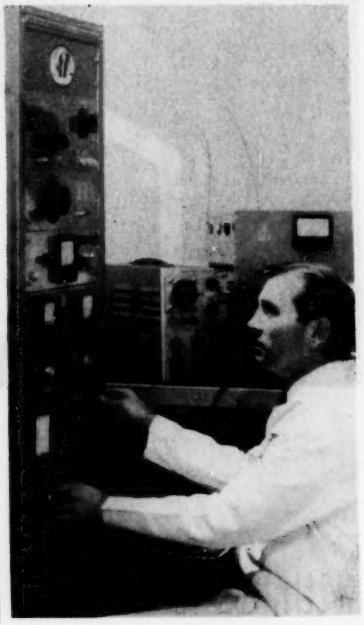
its product or its personnel. As research administrators, we must do more than tolerate the fight for intelligent nonconformity; we must join it." He does suggest that group judgment may reduce quantity but improve quality of group idea output, offers the principle that "the individual is better at action; the groups at judgment."

In Lewis' experience, new Ph.D.s are "usually happier and more creative if they start to work on a problem chosen by management than if they are asked to select one for themselves. They do not lack faith in their



Lab-Size Nuclear Reactor

One man can control this new, scaled-down nuclear reactor intended for laboratory use. Designed for research and training purposes, the reactor operates at a 5-watt power level. Its core is a 1-ft. stainless steel sphere containing about 4 gal. of enriched uranyl sulfate in water solution. The core is surrounded by a 6-in.-thick lead shield housed in an 8x8-ft. tank containing ordinary water. Atomics International (Canoga Park, Calif.), a division of North American Aviation, says it will install the reactor in any existing laboratory without the addition of any special facilities, and on a short delivery schedule.

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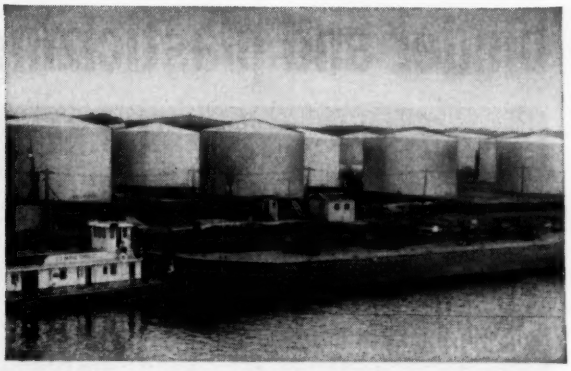

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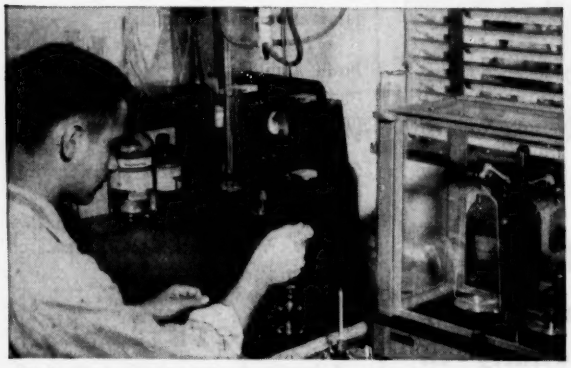

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RESEARCH

creative powers, but only in their perspective."

He adds, however, that it's not long before the newcomers develop personal opinions on what is or is not important. Then, he recommends, it's best to let highly creative individuals follow their own goals. "Many such people," he reports, "will choose research tasks with group goals in mind."

EXPANSION

• Oregon State College has completed a $35,000 forest insect research laboratory. A major part of the new lab's activity will be in testing insecticides.

• Aluminum Co. of America (Pittsburgh) will launch a foil and packaging division at its New Kensington, Pa., research laboratories for studies in aluminum-foil adhesion, coating, lamination and packaging.

• The U.S. Dept. of Agriculture will build a pilot plant in Albany, Calif., to evaluate new wool treatments and finishes.

• Food Machinery and Chemical Corp. (New York) will transfer long-term research projects at its Westvaco Chlor-Alkali Division (South Charleston, W. Va.) to the FMC research center in Princeton, N. J.

PRODUCTS

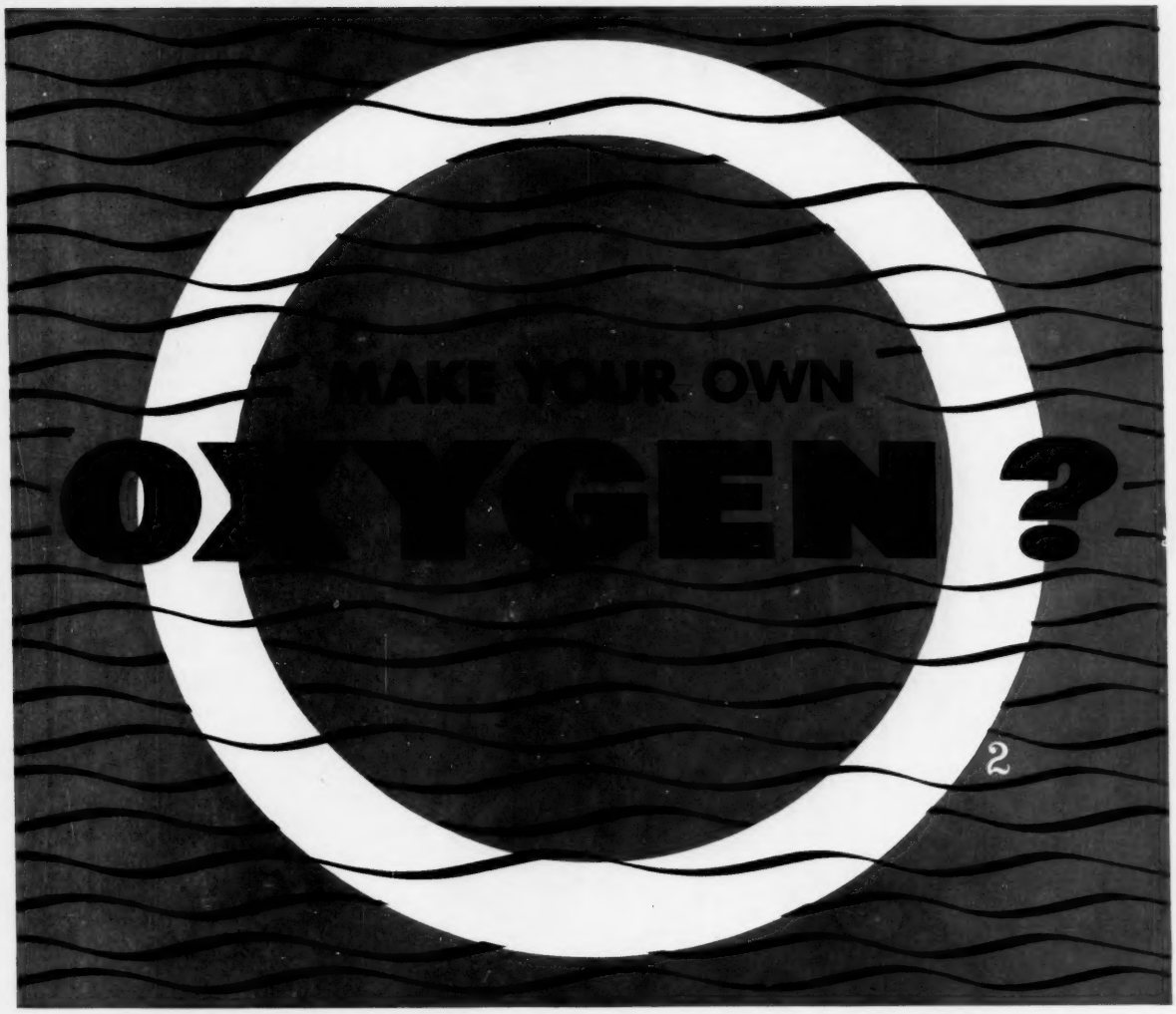
Solvent: A new hydrocarbon—3-ketobutyraldehyde - 1 - dimethylacetal (KBA)—can be obtained from Henley & Co. (New York). KBA is an organic solvent and intermediate, can also reportedly be used to make antiknock agents.

•

Isomers: Ames Laboratories, Inc. (South Norwalk, Conn.), will supply pilot-plant quantities of these primary amines: heptyl—nonyl—and iso-amyl amine; 2,4- and 3,4-dichlorobenzylamine; *O*- and *p*-chlorobenzylamine; *m*-, *o*-, and *p*-methylbenzylamine. All are colorless liquids, reportedly free of secondary and tertiary amines.

APPARATUS

Zone Purifier: A completely automatic apparatus for purifying solid materials by the zone melting technique is now offered by Research Specialties Co. (Berkeley, Calif.).



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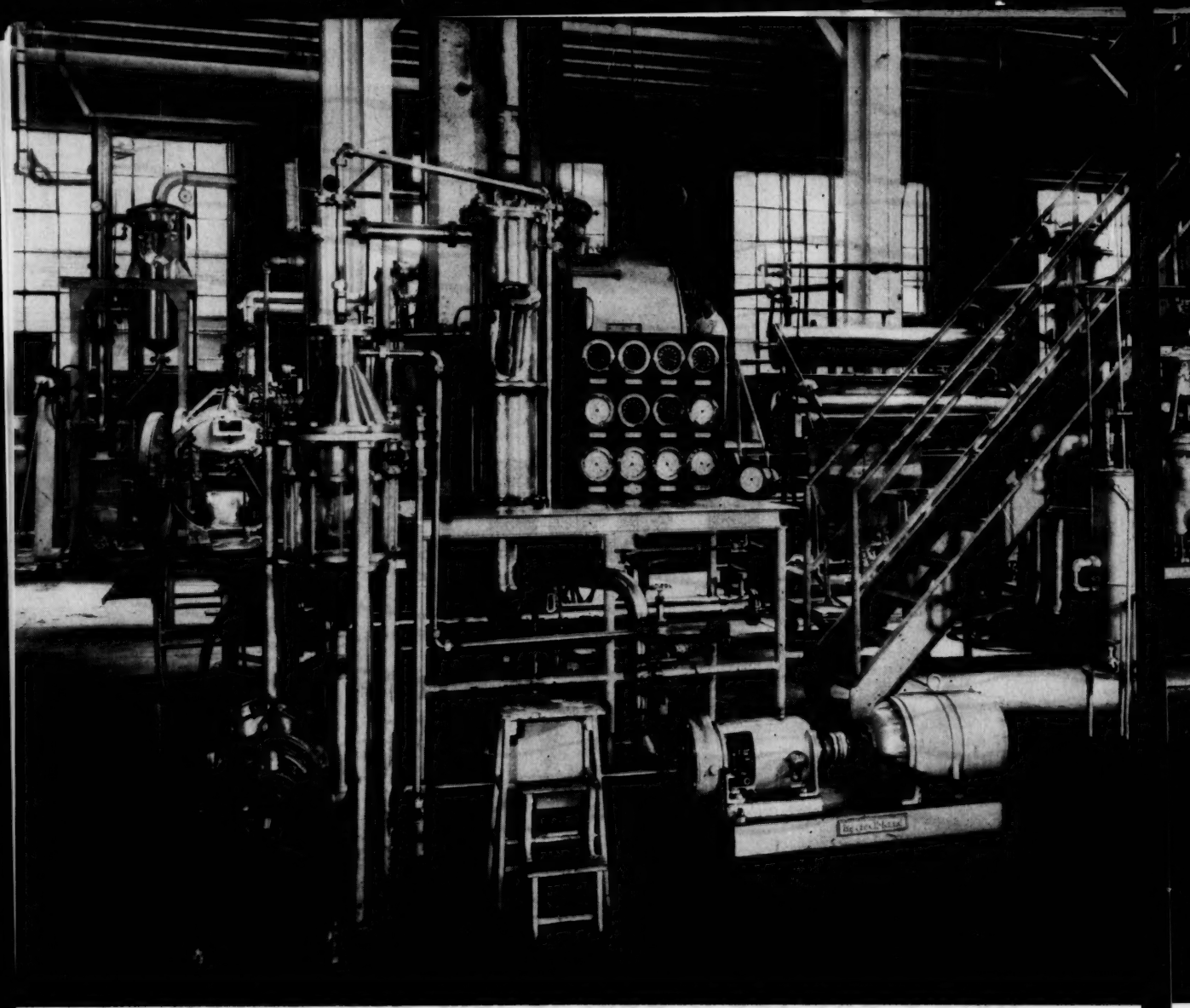

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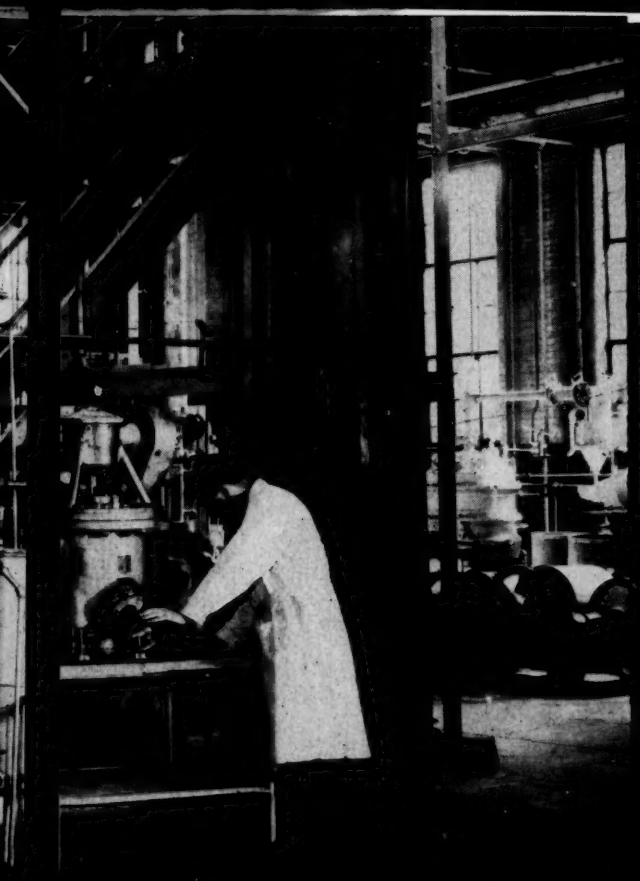
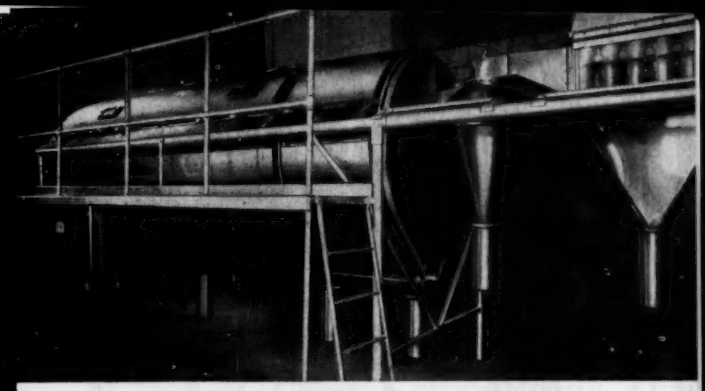
Buflovak laboratory is a complete processing plant equipped with a variety of small experimental units and semi-plant size equipment. New models are continually installed, so that the testing apparatus is always the latest obtainable.

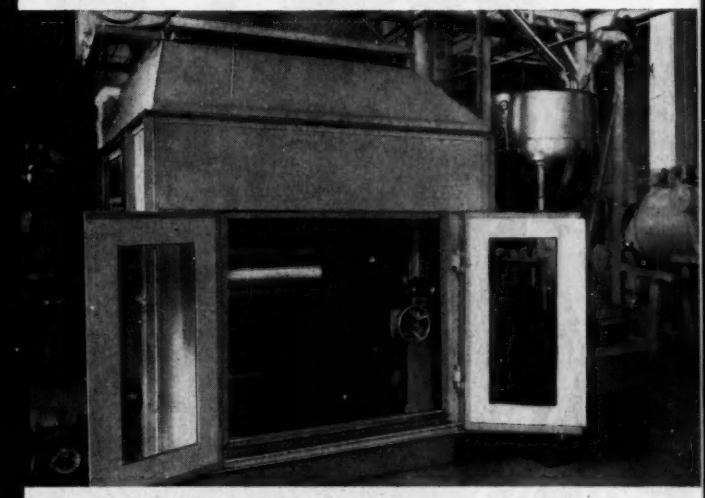
Constant research makes Buflovak designs the most modern in the field, the most dependable in operation. Because Buflovak builds a complete line of processing equip-



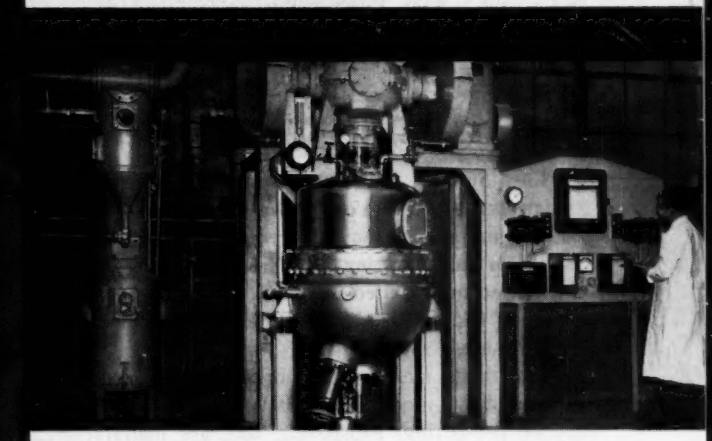
▲ **Testing evaporation.** This Forced Circulation Evaporator (above at left) is used to concentrate heavy liquids. Buflovak evaporators are designed to fulfill a particular application . . . to provide a virtually complete recovery of solids . . . to produce a finished product suited to market and process requirements.



When experimenting with high recovery of solids, this pilot plant Spray Dryer is often used. Instantaneous drying from liquid to dry product provides new product characteristics, opens up new markets for chemical, pharmaceutical and food manufacturers. Noted for its low initial cost, Buflovak Spray Dryers assure low maintenance costs.



How to handle dusty or toxic materials is another aspect of Buflovak research. Dyes, herbicides and other materials can cause serious dust and fire hazards, often release toxic solvents. Buflovak enclosed Double or Twin Drum Dryers have been found to offer complete safety against these dangers, and to permit the reclaiming of important solvents.



Concentrating, mixing, reacting and many other processes are checked in this 50-gallon Stainless Steel Processing Kettle. Tests can be run at atmosphere, under pressure or at full vacuum. It is equipped with a double motion agitator with separate variable speed drives for each agitator element.

ment—such as evaporators, dryers, kettles, autoclaves and flakers—it can impartially recommend the units that sound research indicates the best.

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Growing art consciousness keeps artists out of garrets, art supply dealers in the black.

Profiling a $50-Million/Year Business

Last Sunday, 100,000 art lovers lolled along the sidewalks of New York's Greenwich Village, taking in the autumn art show. Buyers plunked down $10 to $250 for work ranging from fairly good oils to sentimental scenes painted on black velvet in garish fluorescent ink, or obscure Biblical scenes hammered out on brass sheets.

The artists, many of them unloading their wares from trunks of late-model autos, looked well fed and appear to be prospering. Prospering, too, are manufacturers of artists' materials.

Art materials—oils, chalks, pastels, fixatives, etc.—have grown to "big business" status. Demand has multiplied about 13-fold since 1939. Sales volume for these materials in '39 was $3-4 million/year at the manufacturers' level. Today, annual sales are estimated at between $40-50 million and are still climbing.* Sales volume at the retail level is 13% better than last year's. Helping account for this increase: growing numbers of commercial artists, more schools with larger art-supply budgets.

Fifty to 60% of the retail dollar for chemical specialty items in the art field ($20-30 million/year) goes for paints (oils, water colors, casein and tempera.) Another $7.5 million is spent for inks, $2.5 million for fixatives, $2.5 million for pastels and $3 million for rubber cement. Smaller-volume items include chalk, charcoal, oil mediums (mostly turpentine and linseed oil), brush cleaners, clays and drawing aids (cellophane overlays, etc.).

Biggest name in artists' paints is Grumbacher, Inc. (New York), which distributes through some 6,500 out-

*Makers of artists' materials like to place today's sales volume near $150 million/year ($10 million in '39). The majority of materials included in this figure, however, are not chemical specialties. They include brushes, drawing tables, papers, sometimes even stationery, T squares, etc. But some makers contend that only artists (not counting engineers) consume $150 million/year worth of supplies.

lets. Trade sources place England's Winsor and Newton, Inc. (London), second, with about 3,000 U.S. outlets. Shiva Artists' Colors (Chicago) and Craftint Mfg. Co. (Cleveland) battle for third.

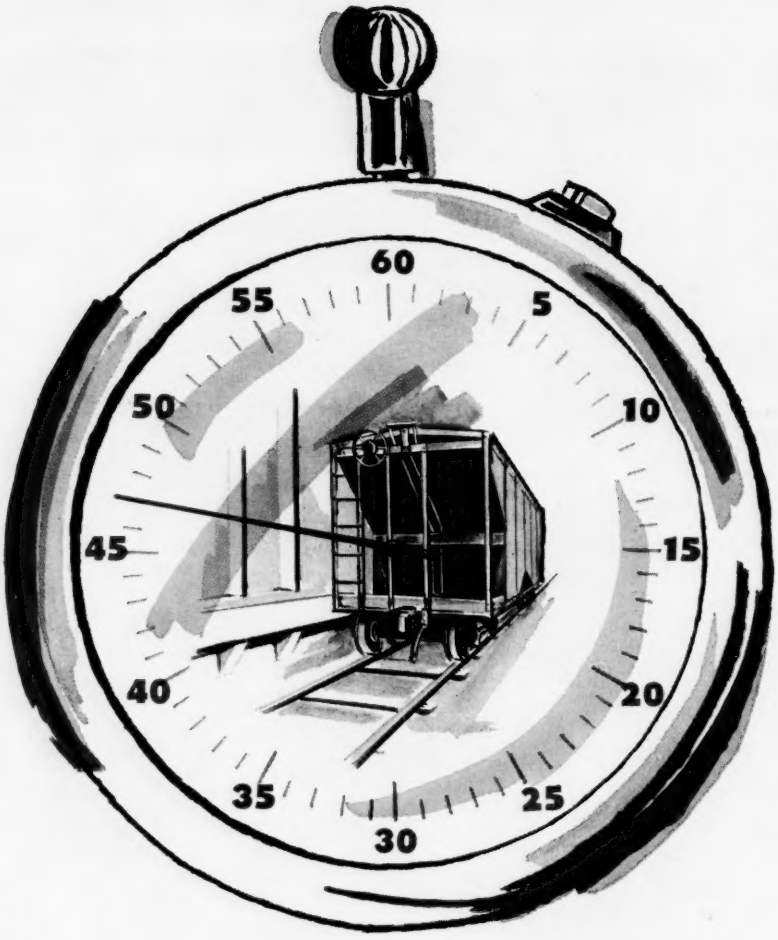
Krylon, Inc. (Norristown, Pa.), is ahead in fixatives (supplying 90% of the market), and Higgins Ink Co. Inc. (Brooklyn) has the lead in inks.

Talens and Sons (Apoldoorn, Holland) and American Artists' Color Works (New York) are leading pastel makers; Talens has a plant at Union, N. J., but still imports about 20-25% of its materials.

Eberhard Faber Pencil Co. (Wilkes-Barre, Pa.), Eagle Pencil Co. (New York) and Dixon Pencil Co. (Jersey City, N. J.) are the "big three" in the colored-pencil field. Other important suppliers of artist materials include Permanent Pigments (Cincinnati), Union Rubber and Asbestos Co. (New York), Conté (Paris, France), Pelikan Wagner (Hanover, Germany) and Carter's Ink Co. (Boston.)

Few Jobbers: Most of these manufacturers sell directly to dealers. Although there are more than 10,000 different items in the art field, there are only about 50 jobbers. One spokesman tells *CW*: "Most retailers' accounts are too small for a jobber to bother with." The jobbers sell mostly to big art stores, which, in turn, sell supplies to the smaller neighborhood

Oil paint	Permanent pigment (60-80%). Linseed oil binder. Aluminum stearate stabilizer, giving buttery consistency.
Water colors	Permanent pigment (20-25%). Blanc Fixe (barium sulfate) filler. Glycerine, dextrine or gum arabic. Water binder. Trace carbolic acid.
Casein	Casein (milk protein). Ammonia to solubilize. Pigment. Balance is water.
Tempera	Pigment (30%). Glycerine and dextrine. Water (35%).
Pastels	Pigment (1-20%). Chalk and plaster.
Fixatives	Synthetic resin (vinyl or acrylic) dissolved in about 90% denatured alcohol.



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BECCO® peroxygen chemicals • FAIRFIELD® pesticide compounds • FMC® organic chemicals • NIAGARA® insecticides, fungicides and industrial sulphur • OHIO-APEX® plasticizers and resins • WESTVACO® alkalis, solvents, phosphates, barium and magnesium chemicals

shops. Jobbers usually work on a 25% margin, while retailers have a 40% markup.

Major outlets for art materials are the art supply stores. These account for about 60% of total sales. In the U.S. there are between 700 and 1,500 art supply stores (a precise count has never been made); New York City has 186 of them. College book stores, department stores, drugstores, variety stores, stationery stores, and countless other "fringe" dealers make up the remainder.

The average art store grosses about $50,000/year, has three employees. The majority of its sales are through mail orders (up to 75%) or by phone (up to 50%, depending on location). Sales to walk-in customers (averaging $2.50) are relatively unimportant.

Respected Vendor: The trend in art stores today, according to one retail dealer, "is up from the grubby basement shops. The increase in art-materials sales has enabled the art-supply retailer to act like a merchant." This retailer's opinion is hardly universal. Says one manufacturer, "No other business has so many stupid dealers. They care nothing about their customers—less about their store's appearance."

The commercial artist is by far the largest consumer of art supplies. Art studios (most of which work with advertising agencies on a fee basis) employing these commercial artists constitute 50-60% of the over-all market. Art schools and colleges account for another 25%. Publishing houses and TV studios are also important users. The amateur is not now a big factor, accounts for not more than 10% of the total market.

National Sales Picture: Regionally, the Atlantic states are biggest in art supply sales but are showing no great yearly increase. The Middle West market—always important—is growing. The West Coast business is remaining stable after a postwar climb. Arizona is first in state sales growth.

The Future's Rosy, If: Art supplies offer the chemical specialties maker a rewarding market—if he's willing to put up with the growing pains endemic to any maturing industry. A specialties maker may well find the business more trouble than it's worth—unless he finds that the problems, like those of art itself, are stimulating challenges.

SULPHUR

helps to create headline products

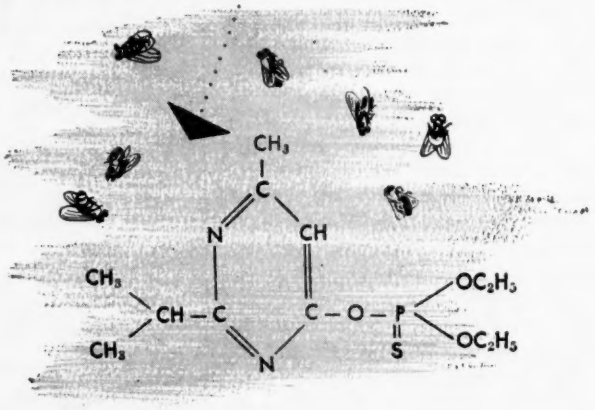
DIAZINON*

What a 'killer' this complex chemical is turning out to be! And quite impartial as to its victims: — houseflies, barnflies, fruitflies, aphids, mites, ants, beetles, chinch bugs, roaches, and many other pests that bother man and beast. It kills them dead!

As with the former chemicals which made such notable headway in man's fight to subdue these destructive pests, Sulphur is very much in the picture—here is one of the many variations of the benzene ring . . . the Diazinon Formula. That letter "S" tied in with the letter "P" discloses the all-important thiophosphate.

Sulphur, often called one of the Four Pillars of the Processing Industry, is benefiting mankind in many ways. None is more important than that of controlling crop-destroying pests.

**A product of the Geigy Chemical Corporation.*



Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.
811 Rusk Avenue, Houston 2, Texas

Sulphur Producing Units
- Newgulf, Texas
- Moss Bluff, Texas
- Spindletop, Texas
- Worland, Wyoming

From industrialist Nagai a first-hand report on . . .

Japan's Chemical Future

Yuzaburo Nagai, president of the Chemical Society of Japan, recently provided U. S. chemical marketers with some penetrating insights into Japan's chemical industry. Occasion: American Chemical Society's national meeting in New York City.

Well known, of course, is Japan's spectacular postwar industrial recovery —notably its big chemical expansion program now under way, the rise of many new chemical industries, and the development of vital export markets *(CW, Feb. 23, p. 100)*.

A less publicized but important aspect of the Japanese industrial picture as drawn by Nagai, is the nation's strong economic dependence on income derived from "special demand" —i.e., demand for products by U. S. troops stationed in Japan, and via the U. S. government's foreign aid fund.

But this source of income is decreasing every year, will eventually disappear. Hence, Japan must try to expand production, especially in industries that can create a sizable difference between the cost of raw material and the market value of the final product. This, in turn, will mean increased fuel and raw-material imports, a continuing effort to expand foreign markets.

To further such industrial expansions, Japan has been spending more each year to attract foreign capital and techniques. A total of 618 technical assistance agreements were concluded by the end of '56; 421 (68%) were with U. S. firms, of which 126 (20%) involved the chemical industry. Payments under this program have been boosted nearly 10-fold in the past few years—from $5.6 million in 1951 to $51 million in '56.

Production Climbs: Output of inorganic chemical products about doubled since '50, while production of organics more than tripled. Especially big was the sevenfold increase of synthetic-resins output. On the other hand, the chemical fertilizer industry—though still a major part of the total chemical scene—is gradually declining in importance.

Polyvinyl chloride has made unexpectedly big strides. Early in '57, annual production of PVC in Japan was estimated at somewhat more than 80,000 tons/year; by June, the monthly output by 13 manufacturers reached 12,000 tons, a 144-000-tons/year rate. The resulting PVC excess created a need for foreign markets and new domestic outlets. Working against Japan in this regard is expected competition with Italy and West Germany; freight and custom duty; U. S. PVC price decreases; forthcoming competition with polyethylene and polystyrene, which Japan will make in the future.

In discussing the textile fiber industry, Nagai drew special attention to a new Japanese synthetic fiber (a polycondensation product of nonamethylene-diamine and urea) developed by Toyo Koatsu Co. The firm will build a 1-ton/day fiber plant, later expand to 15 tons/day.

One striking contribution by Nagai was the presentation of an impressively complete list of forthcoming Japanese petrochemical expansions, complete with plant capacities, and raw materials involved.

Right now, Japanese petrochemical plants can produce 2,400 tons/year of sec-butanol, 1,850 tons/year of methyl ethyl ketone, 2,000 tons/year of isopropanol, and 3,500 tons/year of acetone.

Scheduled to come onstream before '60 are plants that will boost output of petrochemicals by the following amounts (tons/year):

Toluene and xylene, 25,540; benzene, 10,940; acetone, 6,950; ethylene, 25,000; ethylene oxide, 7,400; ethylene glycol, 5,400; polyethylene, 49,-360; polyethylene copolymer, 2,730; propylene, 16,300; butadiene, 5,150; styrene monomer, 36,000; polystyrene, 15,000; styrene rubber, 1,200; GR-S rubber, 43,000; GR-S latex, 7,800; GR-N rubber, 1,500; phenol, 12,000; benzoic acid, 900; dimethyl terephthalate, 7,680; terephthalic acid, 2,215; isophthalic acid, 5,014; phthalic anhydride, 2,290.

Also noted were new plants that will turn out (tons/year): ammonia, 86,300; urea, 82,800; by-product gas, 21,200; sulfur, 6,600.

Slated for construction before '60 are a number of gas chemical plants that, collectively, will augment capacity by the following amounts (tons a year): urea and ammonium sulfate, 100,000 each; ammonia, 129,200; soda ash, 72,000; methanol, 56,400; ammonium chloride, 72,000; acrylonitrile, 7,200; hydrogen cyanide, 6,000; methyl chloride, 3,600 hydrochloric acid, 3,100. (Part of the ammonia production by these plants will be used to make the indicated quantities of ammonium salts.)

One firm, already producing chemi-

Japan's Output of Chemical Fibers

(million pounds)

	1954	1955	1956
Acrylic fiber	—	—	0.1
Vinylon*	8.1	13.6	23.6
Nylon	10.1	17.8	33.8
Vinylidene	3.2	3.4	5.2
Polyvinyl chloride	—	—	0.7
Totals	21.4	34.8	63.4

*Polyvinyl alcohol fiber.

cals from natural gas, can turn out 39,600 tons/year of methanol, 12,000 tons/year of formalin, and 24,000 tons/year of urea.

By '60, says Nagai, Japan will be manufacturing approximately 240,000 tons/year of organic chemical products (excluding urea). The projected estimate makes it certain that Japan's impact on world chemical markets will have to be reckoned with by U. S. chemical sellers.

Wider Use for Nylon 6

Early last week in the plush Hamilton Room of New York's Barclay Hotel, some 20 editors heard a leading European plastics authority—Carl Mienes, of Bad Godesberg, Germany—spell out a heartening prediction of nylon plastics use. In automobiles, for example, use will increase 10-fold—to more than 50 million lbs./year—in the next 5 years.

"I see a great future for nylon plastics in other fields, too," Mienes said, and went on to list potential outlets such as food packaging, gears and machine parts in industry *(CW, April 6, p. 21)*, footwear (nylon heels and top lifts), and "thinner, tougher raincoats that will fold to half the size of those made of polyvinyl chloride or polyethylene."

Mienes, consultant and European representative of Foster Grant Co. (who hosted the hotel affair), also predicted major usage of nylon 6 as housing for appliances. He pointed out that in Germany it's already being used for this purpose, and "it is only a matter of time when nylon production facilities in the U.S. will make it possible to substitute nylon for other materials in appliances."

The availability of nylon 6 in extrusion grades will be the big factor in opening new markets, he said, and emphasized that it is now possible to mold large items of nylon 6 that are "far superior" to those made from any other plastic.

(Foster Grant, incidentally, will next month open a new nylon plastics plant at Manchester, N.H., using a German process new to this country and said to be "considerably more economical" than conventional processes. Nylon 6 for injection molding will be produced initially, and extrusion grades shortly thereafter, according to the company's president, Joseph Foster.)

Mienes, in the course of his talk, also touched on some pertinent statistics concerning plastic production in West Germany. Such production, he said, increased more than 50% from '53 to '56, to 500,000 tons/year—approximately 30% of the comparable U.S. output.

Value of plastic production in West Germany amounted to 1,400 DM last year, about one-seventh the value of world production. Corresponding U.S. figure, he said, was approximately 50% of world production.

Plastics output represents 10% of West German chemical production, and about 1% of total industrial production, Mienes told his audience.

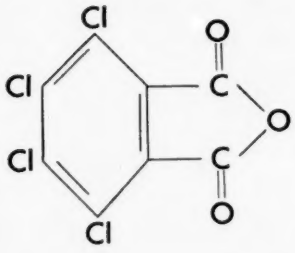
BRIEFS for buyers of

Plastics Additives
Sodium Chlorate
Caustic Soda
Chlorinating Agents

Heat-stable additive makes plastics resist fire

If you want to build heat stability into a plastic product, take a good look at this molecule of *tetrachlorophthalic anhydride*, trade-named NIAGATHAL®.

Nearly half its weight is concentrated in four chlorine atoms, providing a very stable compound that won't melt unless you heat it to 254°-255° C.



Translate these properties to read "fire resistance," "heat resistance," "good electrical qualities"—if, for example, you're adding NIAGATHAL to a polyester resin.

It's most effective in polyesters containing pigment or other filler—lets you load as much as 22% stable chlorine into such resins. When you do this, you come up with a polyester that's inherently, permanently self-extinguishing.

To help you evaluate this chemical, we've put together, in bulletin form, several published papers reviewing its properties and solubilities, its many reactions and suggested uses, as well as uses of derived compounds. To get a copy, just check the coupon for *Bulletin 46*.

If you'd like an evaluation sample of NIAGATHAL, *please write on your business letterhead.*

Sodium chlorate: solids by tank car

Ever hear of a *solid* chemical being shipped by *tank car?*

Purchasing man's nightmare? Not at all. In fact, it's the way many of our customers buy *sodium chlorate,* for safety's sake.

How is the car unloaded? Simply by pumping hot water into it, and piping the resultant slurry into a dissolving tank.

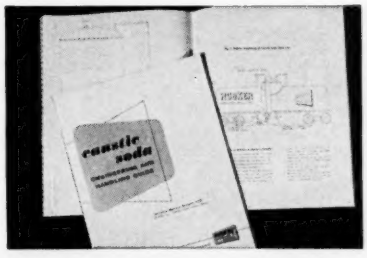
In case you're using, or plan to use, sodium chlorate, you can get full details on this standard unloading method by writing us.

Experienced technical help is one of the advantages you gain by ordering your sodium chlorate from us.

Some others:

1. A material of 99.5% minimum purity.
2. Swiftest service you can get in East and South, from our two Oldbury Products plants at Niagara Falls, N. Y., and Columbus, Miss.
3. Dependable supply. Currently the nation's largest producer, we're expanding still further to meet tomorrow's needs.

For more facts on how we can help you process safely and profitably with sodium chlorate, ask your Hooker salesman or write us today.



40-page manual tells how to handle caustic soda

Written for engineers, this 40-page Hooker manual sums up newest techniques for handling and storage of liquid caustic soda.

Contents include detailed diagrams of equipment; a section on materials of construction; recommendations for unloading, diluting, piping, and storage; and a section on safety precautions and first aid.

For a copy, check the coupon for Hooker Bulletin 102, *Caustic Soda Engineering and Handling Guide.*

Sulfur chlorides for low-cost chlorination

As chlorinating agents, the sulfur chlorides provide you with low-priced sources of chlorine which are relatively easy to handle and store.

Sulfur monochloride, S_2Cl_2, is a definite compound with well-defined properties. This is not true of *sulfur dichloride,* SCl_2. In chlorination reactions, sulfur dichloride may be considered the equivalent of chlorine dissolved in sulfur monochloride.

In general, you can use sulfur monochloride and chlorine wherever sulfur dichloride is required. There are certain advantages in doing so, since sulfur monochloride can be purified by distillation and stored without gas pressure developing in the container.

Hooker sulfur monochloride is a yellow to slightly reddish heavy liquid containing 52.0 to 52.5% chlorine. Hooker sulfur dichloride, a brownish-red liquid, contains 66% min. chlorine.

For some helpful tips on chlorination with these and other Hooker chlorinating agents (chlorine, sulfuryl chloride, thionyl chloride, hydrogen chloride), check the coupon for Bulletin 328-A, *Hooker Chlorinating Agents.* You can use the coupon also to request technical data sheets on any of these chemicals.

for your file . . . new data on:

Sodium chlorate, $NaClO_3$ (OLDBURY®)
Potassium chlorate, $KClO_3$ (OLDBURY)

New data sheets on these two chemicals have been released. For copies, check the coupon on this page.

For more information on chemicals mentioned on this page, check here:

- ☐ NIAGATHAL (tetrachlorophthalic anhydride)
- ☐ Caustic Soda (data sheet)
- ☐ Bulletin 102, *Caustic Soda Engineering and Handling Guide*
- ☐ Sodium Chlorate
- ☐ Potassium Chlorate
- ☐ Sulfur Monochloride
- ☐ Sulfur Dichloride
- ☐ Sulfuryl Chloride
- ☐ Hydrogen Chloride
- ☐ Chlorine
- ☐ Bulletin 328-A, *Hooker Chlorinating Agents*
- ☐ New list of products —Bulletin 100-A

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CHEMICALS

Market Newsletter

CHEMICAL WEEK
September 28, 1957

The sulfur industry is still in a state of turmoil following last week's slam-bang price maneuvers, and chances are the situation will boil for some time to come. But there's no doubt that these developments have sulfur consumers cheering on the sidelines:

• On Wednesday, Texas Gulf Sulphur revealed that it was knocking $3/long ton off its price of bright (top-grade) sulfur, and $2.50 off dark sulfur tags. The reductions were to apply to customers in the U.S. and Canada only.

• Within hours, Freeport Sulphur went TG a step further, announced a straight-across-the-board cut of $3/ton on domestic, Canadian and other export prices.

• Texas Gulf then amended its initial action, went along with Freeport's broader reductions.

The new schedules pegged U. S. producers' prices at $23.50 and $22.50/long ton for bright and dark sulfur, respectively, and cut export prices down to a basis of $25 (bright) and $24 (dark), f.o.b. port.

TG's explanation for initiating the sulfur price-cut was limited to a terse "general competitive conditions," but few in the trade doubt the major U.S. sulfur producers' decision to lower prices at this time was anything but a direct swipe at the lower-cost Mexican material that has been hitting world markets at an increasing pace (*CW Market Newsletter, Jan. 12*). The latter material has been selling at about $1.50-$2/ton under U.S. prices.

Mexican producers will re-establish the differentials, they tell *CW*, and, if subsequent action on the part of U.S. sellers makes it necessary, continue to cut their prices to maintain the spread. One Mexican producer said privately, "We won't be driven out of the market."

The phrase "price war" isn't being mentioned by either side, but the implication is clear. And the Mexican marketers, comparative newcomers in the sulfur arena (*CW, July 7, '56, p. 72*), may well be counting on Mexican government support should the intramarket squabble get hotter. Probable props would include a reduction in royalties they pay to the government, or some sort of direct subsidization, or both.

At any rate, market followers expect further developments—and they expect such developments soon.

•

When—and how hard—will sulfuric acid prices be affected by the lower sulfur prices? Probably not as soon nor as drastically as some users would like. Right now, acid sellers are weighing the sulfur reductions against increased sulfuric manufacturing costs (labor, transportation), but such figuring is only tentative. As one maker explains the "go-slow" atti-

tude: "There's no sense posting a lower price now—we'll wait until sulfur prices are firm."

Sulfuric price changes are usually based on a ratio of, roughly, $1/ton for each $3/ton change in sulfur. But it's a cinch that any imminent cut will be tempered by the higher production costs sulfuric makers have been absorbing over the past few years.

Cylinder chlorine prices are being advanced for the same reasons. Pennsalt, in announcing an across-the-board increase of 75¢/cwt., points out that although prices haven't been hiked since late in '55, freight rates have gone up about 20%, wages about 17%, and other manufacturing costs in proportion.

The higher prices on cylinder material take effect Oct. 1 on spot business, and on bid and contract negotiations later. Existing contracts will not be affected until after their expiration dates or Jan. 1, '58, whichever occurs first.

•

The government will buy less aluminum, and at lower prices. Just-completed revisions in stockpile-buying contracts with major sellers will save taxpayers "between $75-100 million," says Sen. A. Willis Robertson (D., Va.), chairman of the Senate-House Committee on Defense Production.

One key concession by aluminum makers Alcoa and Kaiser: each will deduct an amount equal to their Canadian imports from the surplus metal they tender to the U. S. government. In addition, the revisions provide for: upping the quality of aluminum offered for stockpiling —from 99% purity to 99.3%; selling aluminum at the market price prevailing at time of production rather than when delivered; increasing the amount of aluminum to be made available to smaller, nonintegrated users.

•

A lot more petrochemicals will be produced in western Europe in the next few years. Output by '59 will exceed 1 million tons/year, compared with the current 600,000 tons/year. So predicted Colin Haley, of Esso Research Ltd., Abingdon, England, at the 30th International Congress of Industrial Chemistry.

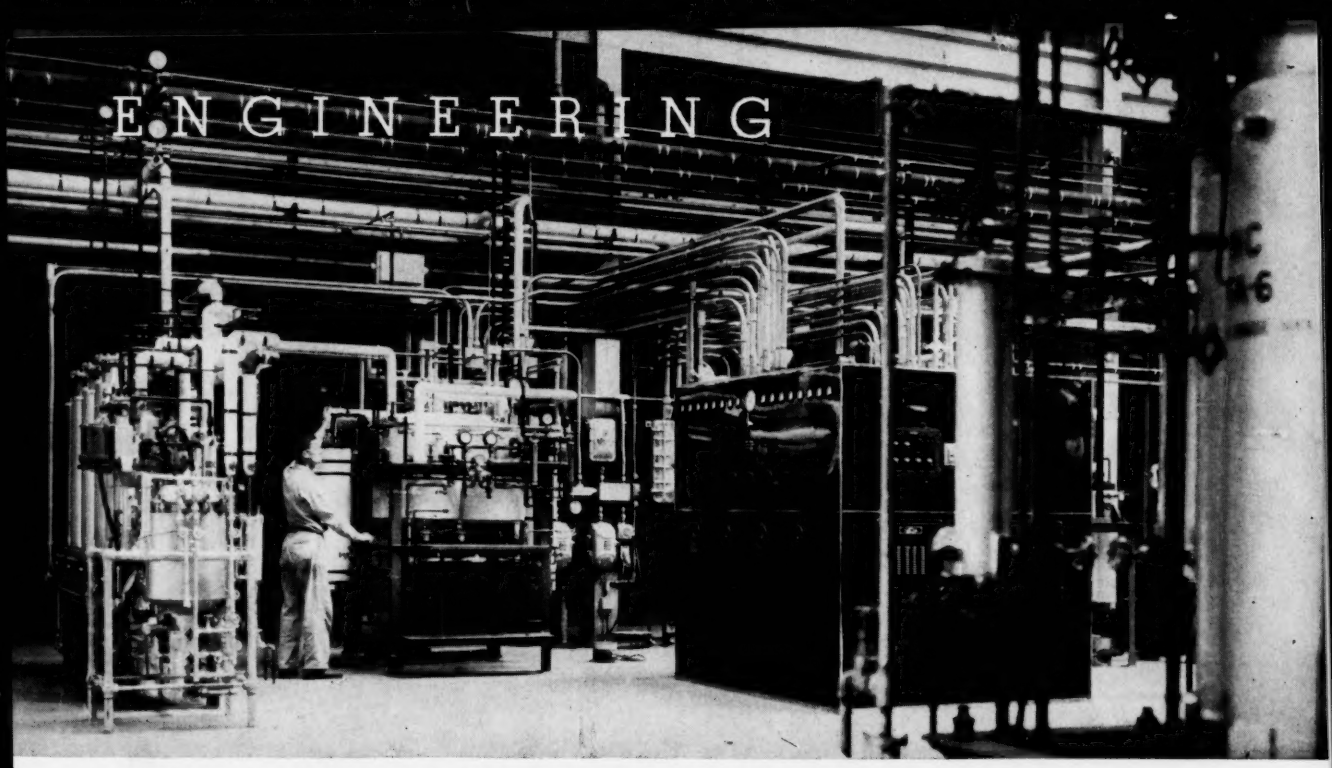
Contributing to the petrochemicals growth, according to Haley: expanded use of polyethylene synthetic rubber, synthetic detergents.

SELECTED PRICE CHANGES — WEEK ENDING SEPTEMBER 23, 1957

DOWN

	Change	New Price
Eugenol, drms., spot	$0.10	$ 2.25
Soybean oil, crude tks., Decatur	0.0025	0.11
Sulfur, crude, bulk, f.o.b. cars, mines, long tons	3.00	23.50
Sulfur, crude, bulk, export, f.o.b. vessels, Gulf ports, long tons	3.00	25.00

All prices per pound unless quantity is stated.



At Lummus' Engineering Development Center, pilot building blocks are unitized to give a . . .

Fast Switch in Process Engineering

In keeping with their growing contribution to the commercial success of chemical processes and products, pilot plants are being moved out of the back room, transformed into productive showcases of engineering know-how. A case in point: the unitized pilot-plant setup at Lummus Co.'s new Engineering Development Center at Newark, N. J.

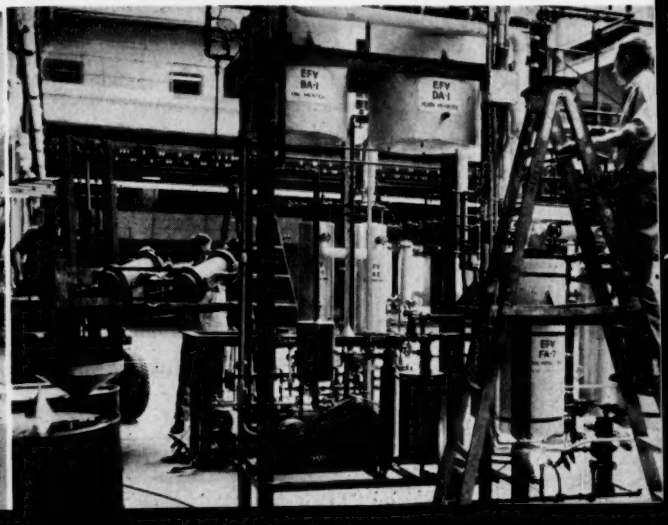
Though many developmental units are as much at home in research work as they are in the early stages of production, Lummus' facilities are clearly aimed at process engineering. Says Robert Dodd, director of the center: "We're not set up to do basic chemical research—we leave that to others to do. Our job is engineering and constructing plants." To that end, the company emphasizes flexibiliy of pilot units to permit fast, accurate scale-up of proved processing techniques.

Building Blocks: A key feature of Lummus' pilot plant is the unitized design of equipment. The several sections of the 150,000-sq. ft. center are broken down according to the unit processes (e.g., oxidation, reduction, catalytic cracking, esterification, hydrogenation, polymerization) employed in each. This arrangement facilitates process engineering by allowing specialists in each section to concentrate on one part of the overall design at a time.

Complete units could be installed or removed, because the building is a converted factory built to accommodate an overhead crane, heavy equipment on the floor. The structure also gives the equipment plenty of headroom.

To simplify duplication of actual production processes within the various areas, pilot equipment is further broken down by unit operations, such as heating and cooling, distillation, fractionation, contacting, filtration, and solvent extraction. In some cases, these basic units consist of a single

Skid-mounted assemblies (left) or single components are easily rearranged to meet processing needs.



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- *Xylene*

Our new petrochemical plant at Corpus Christi, Texas went on stream July 15th and is now supplying high purity, nitration grade benzene, toluene and xylene to the plastics, paint, pharmaceutical and other chemical process industries.

Using a combination UOP Platformer–Udex process with an annual production of 45,000,000 gallons, the new Delhi-Taylor plant is equipped with the most up-to-date process control systems, insuring product quality and uniformity to meet the most stringent specifications.

Our plant has its own docking facilities and is conveniently located for bulk shipments by barge, tank car or truck.

For detailed information on product specifications, prices and delivery schedules, write to Chemical Division, Delhi-Taylor Oil Corp., 415 Madison Ave., New York 20, N. Y.

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CHEMICAL DIVISION

DELHI-TAYLOR OIL CORP.

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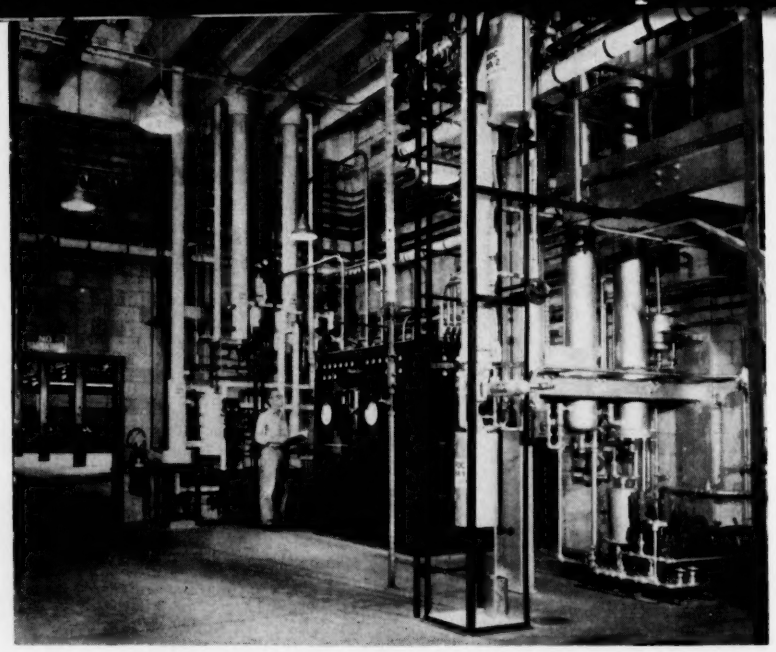
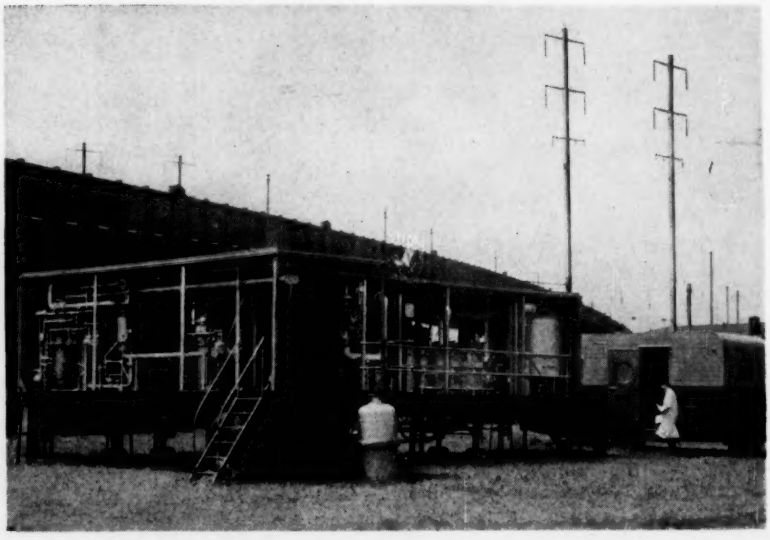


Functional grouping permits specialized study of unit processes.

item of equipment; in others, they may include a completely integrated system of all the vessels, pumps, piping and auxiliary components commonly used in combination for a repetitive operation.

Control systems, too, follow the scheme of unitization. In the large open bay where the most frequently altered pilot processes are located, electrical service, switches and meters are conveniently grouped in two black plastic-paneled control cubicles. Each cubicle is maintained at a slight positive pressure to exclude process vapors, can handle simultaneously the control of as many as four separate pilot operations.

Quick Change: What Lummus gains from unitized pilot equipment is the ability to handle in rapid succession a number of different types of processes. Simple changes in the products being handled can often be accommodated merely by altering the operating temperatures and pressures of the multipurpose units. A more extensive change, such as switching from crude oil to an asphalt feed in a fractionation process, often involves nothing more complicated than substitution of unitized charging systems. And even when systems must be completely rearranged to duplicate a commercial process, time-consuming electrical work and plumbing is minimized by



Trailer-mounted pilot plant rolls right to prospective site.

ENGINEERING

the use of preconnected, skid-mounted units.

Aside from the obvious economic advantages of packaging pilot equipment for maximum utilization throughout its service life, Lummus' unitization plan contributes greatly to predictability of performance—a key factor in the scale-up of multi-million-dollar production plants. Working with familiar components—even in a completely new chemical or refining process—Lummus engineers don't have to go through lengthy shakedown runs to learn the idiosyncracies of the equipment, can devote their full time to the study of operating variables and yields, the elimination of process bugs.

In the Field: Carrying the packaged pilot plant a step further, Lummus employs similar techniques in assembling trailer-mounted processing units that can be wheeled right into a customer's plant. Tied into commercial facilities, they serve as operating prototypes for the evaluation of raw materials or for the study of integrated production operations.

One such unit available at the Newark site is a complete acetylene plant mounted on two standard trailer beds. Second Wulff process acetylene plant built in the U.S., it features an improved combustion chamber of Lummus' own design. Transported across the country by rail and by tractor truck, it was operated over a period of months for pilot production of acetylene at a Midwest refinery. A small house trailer—the third part of this pilot plant on wheels—provided the necessary laboratory facilities, served as headquarters for engineering personnel in the field.

PROCESSES

Semiprecision Molding: National Cylinder Gas Co. has developed a new process for making semiprecision sand molds for metal castings, using carbon dioxide and a sodium silicate-based binder. The process features both close tolerances and economical operation. Full-scale foundry trials are said to have produced molds equivalent to products of shell molding. In casting highly configurated impellers, 1% tolerances can be held easily, while 0.2-0.4% tolerances are reported for simpler jobs. The process is also fast and cheap. Operation at

ENGINEERING

room temperature allows the use of inexpensive patterns, and the molds harden in 15-30 seconds, compared with 40-75 seconds for a shell mold. Little capital investment is needed—the process requires only a carbon dioxide gas supply, regulating equipment and gassing heads, a sodium silicate binder and aluminum or plastic patterns. The process consists of mixing sodium silicate and fine sand (100-180 AFS grain size) and ramming the mixture into a mold pattern. Gassing with carbon dioxide forms a silica gel that coats the grains of sand and binds them firmly. Molds as thin as ½ in. are practical, according to NCG.

•

Retread Curing: Goodyear Tire & Rubber Co. has purchased rights to a new curing method to be used in retreading tires from Gibbs Research & Mfg. Corp. (Janesville, Wis.). The Gibbs Electronic Speed Cure consists of applying heat to the inside of the casing in the retreading mold at the same time heat is applied from the mold itself. Inside heating is accomplished by use of a rubber pad in which wires have been laid in serpentine fashion and an electronic control unit. Advantages of the method are said to be a 50% cut in curing time (allowing a corresponding increase in retreading capacity) and more uniform cures, which result in longer tread wear.

•

Pozzuolanic Cement: The agency in charge of constructing the 780-ft.-high Bhakra (Punjab, India) dam is making pozzuolanic cement, using shales and clays from surrounding deposits as the basic raw material. Demand for the material in hydraulic and sea-water construction applications has encouraged Associated Cement Companies, India's largest cement manufacturer, to build a plant that will produce 350,000 tons/year.

•

Fermentation Glycerine: New interest in fermentation glycerine is being shown by Scientific Design Co. (New York). SD has licensed a process from Imperial Chemical Industries, engineered it for commercial plant use. According to SD, the fermentation route can compete with synthesis (from propylene) when blackstrap molasses price is $25-30/ton.

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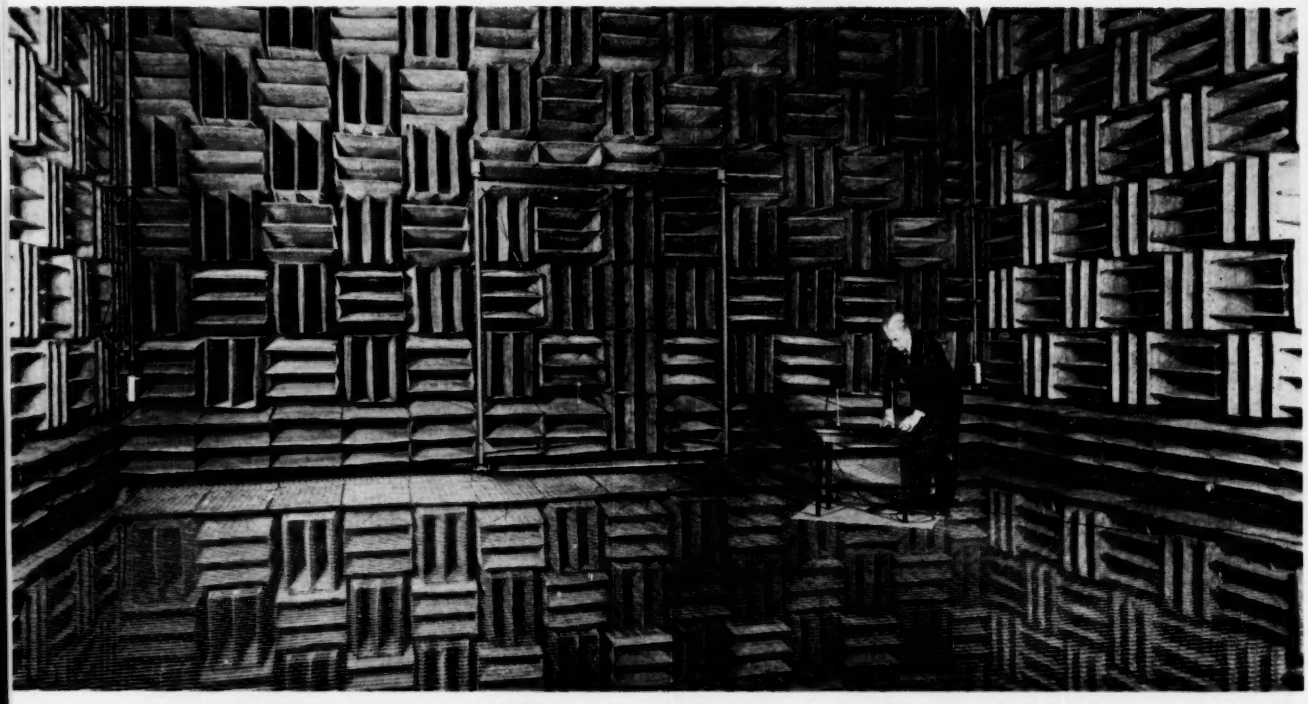


Nonreverberant chamber for Bell Labs' sound tests. Sound studies on machinery are used in . . .

Putting the Damper on Industrial Noise

New workers starting on chemical plant jobs this week are taking physical examinations that include a hearing test. The test is unobtrusive—a part of regular employment procedure. Yet, to management of some firms, the test marks the beginning of a future as honeycombed with potential problems as the nonreverberant acoutic test chamber at Bell Telephone Laboratories (*above*) is honeycombed with sound-absorbing material.

- Chemical plants, often considered the silent type (particularly by those outside the industry), actually have some of the noisiest machines and working areas. They are considered noisier than the average factory (*CW, Feb. 27, '54, p. 38*).
- Industrial noise control is still a young field—most developments have come within the past few years.
- Employee hearing loss is difficult to pin down, even when reference tests are taken on employment. How to determine a hearing loss with exactness is a question (*see box, p. 99*).
- Few states agree on compensation for hearing loss, but most provide for it. And many states have increased compensation within the past few years—two within the past month.*

Active Awareness: Chemical firms are among the most active in recognizing noise as a production problem. Some test hearing of all new employees; others test at certain plants.

Du Pont is a pioneer in this area. In addition to hearing tests for employment, it has been running biostatistical studies for a number of years. Dr. John Vapp, director of Du Pont's Haskell Laboratory for Industrial Medicine and Toxicology, has lectured at the New York University-Bellevue Medical Center.

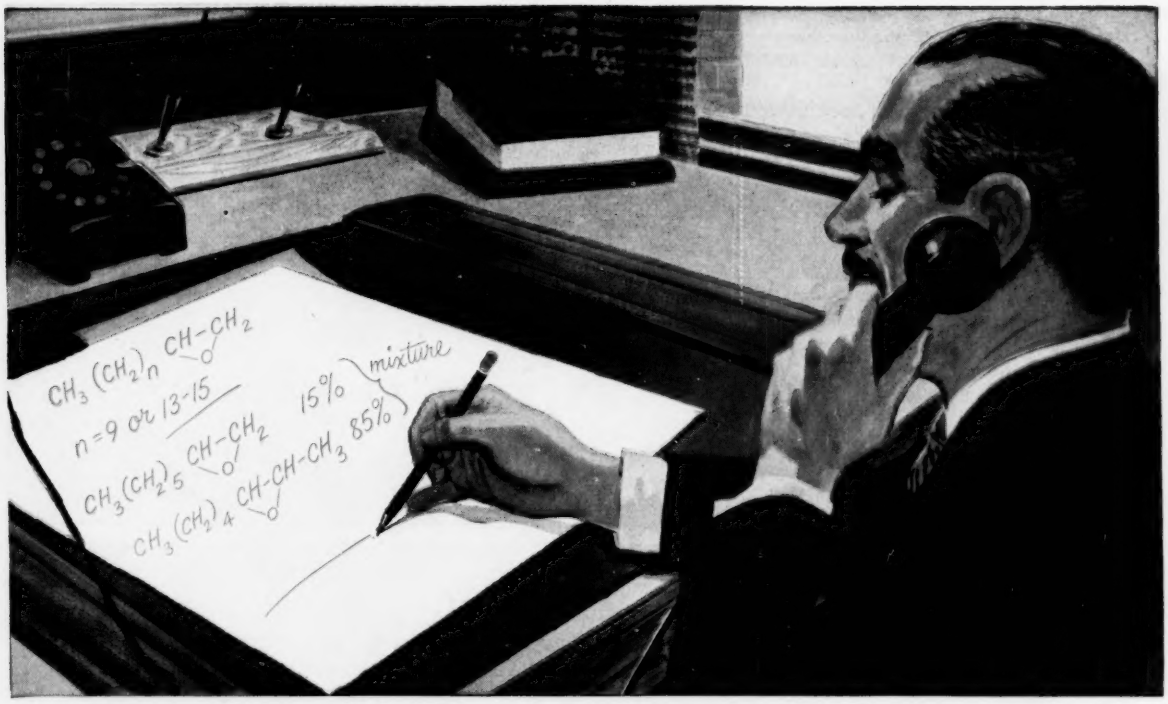
Union Carbide Corp.'s Union Carbide Chemicals Co. initiated employee hearing tests at its larger plants several years ago. Testing has now spread to other divisions of the company. Mallinckrodt tests the hearing of all new employees at the uranium-processing plants it runs for the Atomic Energy Commission. Esso Standard Oil checks the hearing of all its refinery workers.

Industry spends about $400 million a year on consultants and sound-reduction equipment, according to the only available estimate (most firms in the sound field refuse to hazard a guess, say the field is too young even for educated guessing). Biggest taker of services and equipment is the aircraft industry. Excluding aircraft-industry exenditures and outlay for soundproofing air-conditioning equipment, industry probably spends a total of $25 million/year for sound reduction.

And as firms become more familiar with noise control and what it offers —i.e., for hearing-loss prevention, worker efficiency and (in some cases) community relations—they begin to lose much of their original fear of the subject, says George Wilkening, industrial hygienist for Esso.

But, gaining familiarity sometimes

*California increased maximum permanent disability payments from $35 to $40/week, maximum temporary disability payments from $40 to $50/week, effective Sept. 11; Texas increased from $25 to $35/week maximum compensation for specific injury (including hearing loss), effective Sept. 1.



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C_{16}—C_{18} OLEFIN OXIDE mixed 1,2-epoxy-n-hexadecane and -n-octadecane	ca 15	>110 (0.5mm)	0.842	insoluble in water, soluble in hydrocarbons and other organic solvents.

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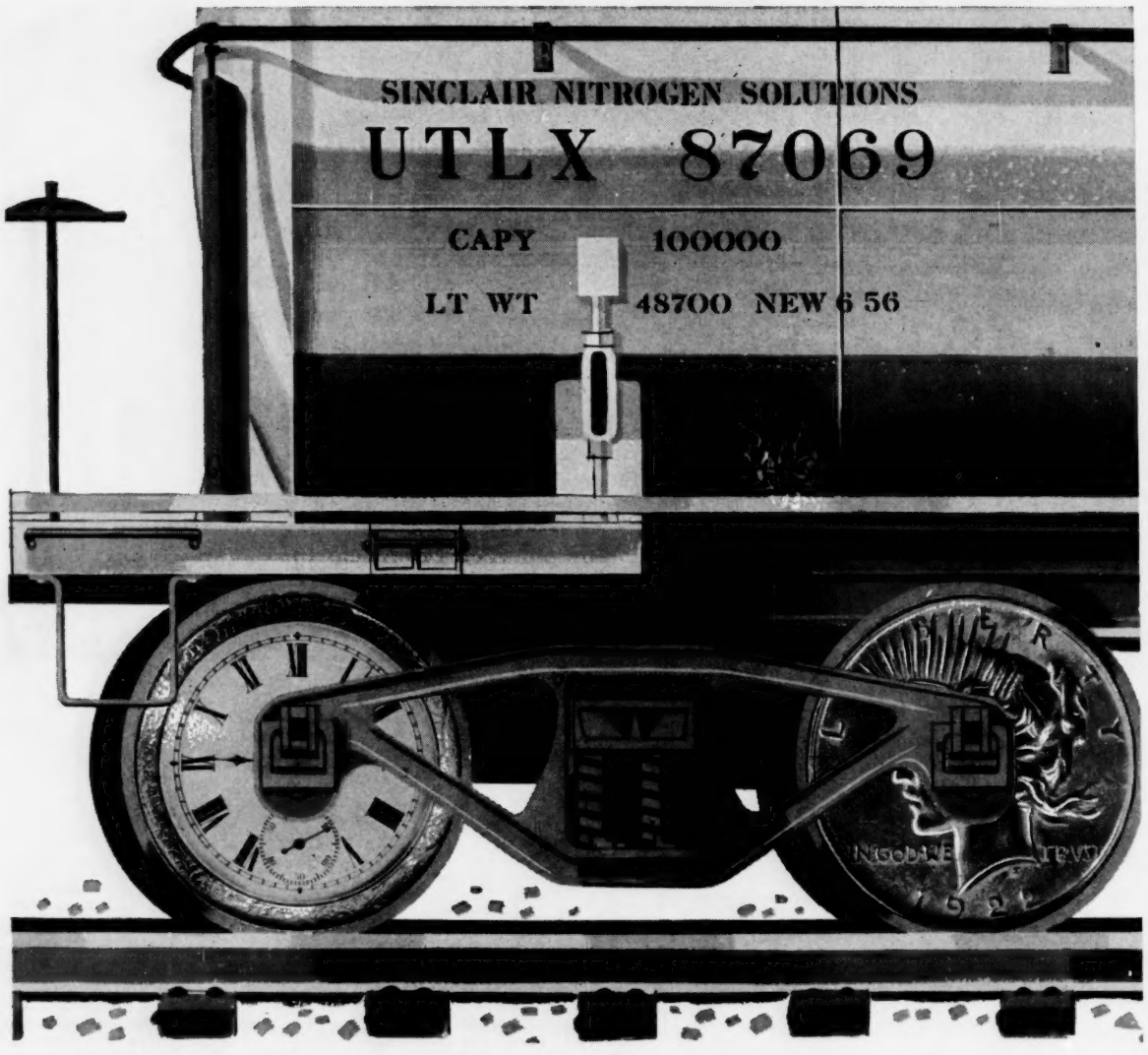

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What Is Hearing Loss?

Few states agree on what constitutes hearing loss—a few are very strict, some are lenient. Many states recognize that loss of hearing often does not reduce the worker's earning power, set hearing-loss compensation lower than for some industrial accidents. Some states have no set formula for compensation (West Virginia's Claims Director Harry Bess says one reason is that hearing claims are easily faked).

But many states and firms are watching Wisconsin closely. It is there that, by legislative action, industrial noise problems were first officially recognized. Formulas for determining percentage deafness and figuring total award as a result of some deafness in both ears are clearly defined in the statutes:

- Pure-tone air-conduction audiometric tests are made at three frequencies—500, 1,000 and 2,000 cycles/second—within the limits of ordinary speech conversation. An average of three readings is computed, converted into percent of hearing loss, using a table. Readings below 16 decibels are considered 0% loss and above 80 decibels, 100% loss.
- Hearing loss in both ears is considered five times as serious as in one ear only, receives maximum compensation of $37/week for 180 weeks, compared with 36 weeks for one ear.
- For partial loss in both ears—e.g., 20% loss in one ear, 70% loss in other ear—a computation is made as follows: smaller loss is multiplied by four, added to larger loss. Total is divided by five, giving 30% hearing loss.
- Indemnity is reduced by 2.5% for each year of employee's age above 50 (maximum reduction: 50%). Temporary hearing losses are not considered—on periodical retesting, 5-decibels recovery in hearing is allowable.

requires a lot of work: another Standard Oil of New Jersey affiliate, Imperial, had every noise in its Sarnia, Ont., refinery tested and cataloged.

At Monsanto, study of noise problems began about 12 years ago, and after a two-year pilot study of some of the noisiest areas, investigation was intensified to include noise problems at all plants. Elmer P. Wheeler, the firm's chief industrial hygienist, agrees with Wilkening, says: "Noise problems are most often caused by general machinery not peculiar to the chemical industry. One way or another, we have been able to lick every problem of industrial noise we have encountered so far."

No One Solution: Few problems are exactly alike, although most fall into three general areas: (1) control through original design, (2) control through muffling, (3) isolation of noise equipment from workers.

And there is no exact rule for determining a tolerable noise level. Most chemical firms, insurance companies and consultants agree that, as a general rule, noise levels above 90 decibels will cause hearing damage. But exposure time is important, too.

In addition, consideration must be given to the noise level of each octave band (e.g., a noise may have an over-all level of 80 decibels, yet be considered a problem because in some individual octaves it is too loud).

Design: Some firms work with equipment manufacturers, like GE, Allis-Chalmers, Fairbanks, Morse & Co., and Worthington, are constantly trying to improve design of their products. In steam turbines, for example, blade and nozzle design improvements have cut noise. In diesel and gasoline engines, manifold design changes can be effective in this respect.

Many chemical firms cite compressors as their biggest noise problem. Yet, noise control is sometimes pos-

Manager

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PRODUCTION

sible — particularly when working against constant heads.

Esso Standard Oil has come up with some innovations of its own. In some 300-psig. control valves, for example, the valve plugs were changed from "V" port type to parabolic type, with a resulting reduction of noise.

Muffling: When design improvements won't suffice, mufflers or silencers are often tried. Du Pont will install a 12-ft. stainless-steel twister muffler on the exhaust stack of a gas turbine at Gibbstown, N. J.

Rohm & Haas, at its low-temperature air-separation plant nearing completion at Houston, Tex., is installing a 16-ft.-long blow-off valve muffler.

Esso solved a pipeline noise problem on a gas-turbine installation by covering the line with acoustic matting and an impervious outer liner.

Solutions often lie in enclosing the equipment, whether it is a gas turbine compressor or—as in Mallinckrodt's uranium processing plants—ball mills and crushers. Mallinckrodt enclosed the machinery in a structure consisting of two sheets of steel separated by absorbent fibers of lead and zinc wire. If workers spend most of their time in control rooms, it is sometimes possible to soundproof the room rather than the equipment.

Outside Help: Most chemical firms and equipment manufacturers rely on outside help—particularly with difficult problems. Companies faced with a difficult noise problem can call in consultants such as Bolt Beranek and Newman, Inc. (Cambridge, Mass.), to prescribe a cure. Koppers Co.'s industrial sound control department (Baltimore, Md.) is another source of assistance, also supplies mufflers and acoustical panelling.

Monsanto has received its greatest assistance in identifying and correcting noise problems from its liability insurance underwriter.

What It Costs: Solutions to noise problems aren't always cheap. Panelling to surround equipment can cost $20,000 or more, is often extremely heavy. This, in turn, may require reinforcement for floors. Mufflers can cost as much as $10,000. But sometimes a $300 muffler or inexpensive ear-muff protectors will do the job.

Whatever the cost, however, more and more chemical firms are finding that it pays to do something about their noise problems.

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September 28, 1957

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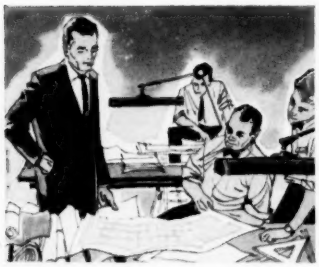

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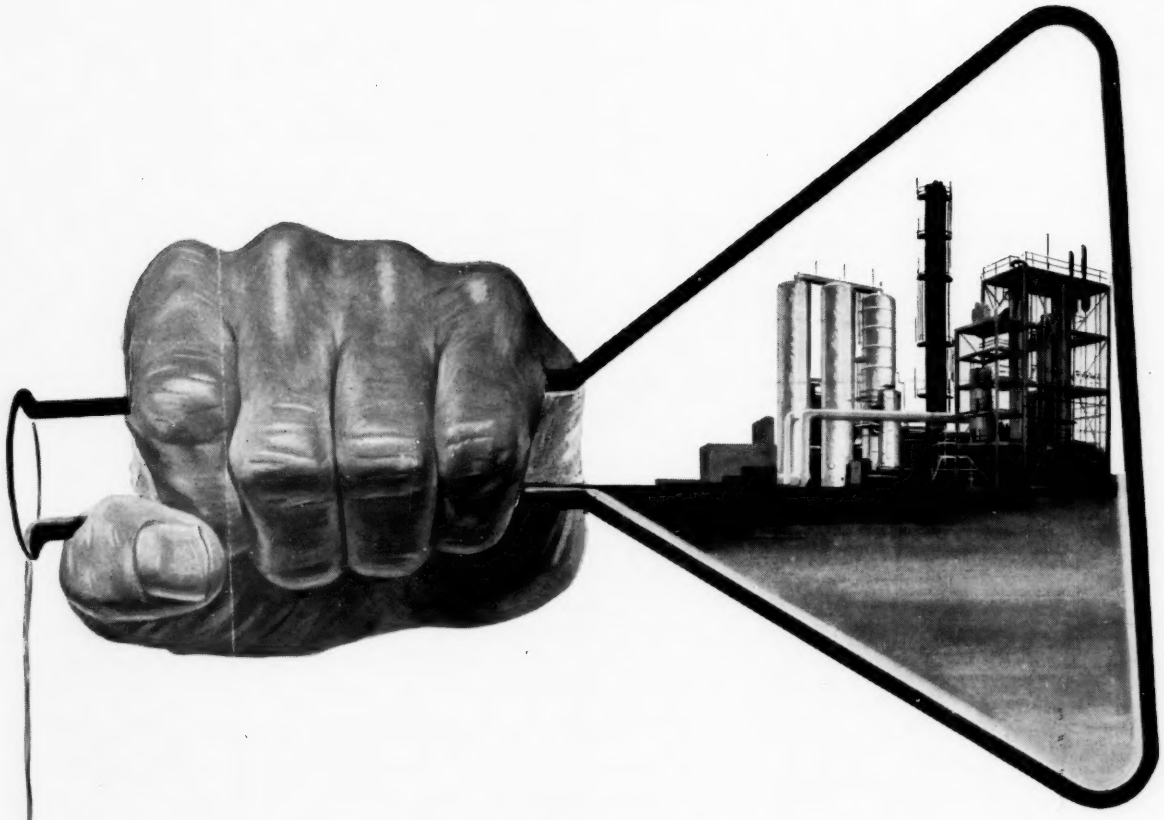

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